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VIEWS, NEWS AND INTERVIEWS.

Mr. W. S. Hine, a well-known Chicago electrical man, has a reputation among his friends for being quick-witted and also witty. Recently he was standing in a railway depot in Chicago when an Englishman, apparently of the cockney type, approached Mr. Hine and pointing to a train standing in the depot said:

"Beg pawdon, but is this the train for Helgin?"

To which Mr. Hine instantly responded:

"No, sir; that's the train for Hevanston."

Elgin will probably appreciate this joke a good deal less than Evanston.

It is reported that a cable will soon be laid between Iceland and the Shetland Islands, the northernmost point of the British telegraph system. The money has been subscribed, Great Britain, Iceland and Denmark jointly guaranteeing six per cent interest for a number of years.

Representative Smith, of Michigan, expecting a holiday recess would be taken by the House, accepted the invitation of the Young Men's Republican Club of Grand Rapids, Mich., to address it one night last week. He was called to Washington to be present in the House until the revenue and bond bills are disposed of. On his arrival he dictated his speech into a phonograph and sent it by express to Grand Rapids, where it was delivered by another phonograph to the audience.

Robert Gillham has filed in Judge Henry's court in Kansas City, Mo., his report as receiver of the Northeast Electric Railway for the 25 months ending October 1, 1895. It shows that the receipts of the road during that time were $94,611.22 and that there is now on deposit $2,715.38 to the road's credit. Fares collected during the last eight months amounted to $34,424.19. The court allowed Mr. Gillham $12,500, or $500 a month, for his services.

The Pittsfield, Mass., *Sun* says that a report comes from Great Barrington that William Stanley is to establish a factory for the manufacture of electrical supplies in that town.

What, What, What?

[From the New Britain, Conn., Morning Dispatch.]

Superintendent Breed, of the electric company, has told J. B. Weiant, in regard to having the electric lights turned on for fires after 1 o'clock, that it would be impossible to get up steam to start the engine before the fire was out.

A SUSPENDED BEAM ELECTRIC TRAMWAY.

A MODERN METHOD OF HANDLING FURNACE COVERS IN A CARBON PLANT.

The Brown Hoisting and Conveying Machine Company, of Cleveland, Ohio, about a year ago made an interesting suspended beam electric tramway installation in the carbon manufacturing plant of the National Carbon Company at Cleveland. The system is for the first time illustrated and described herewith.

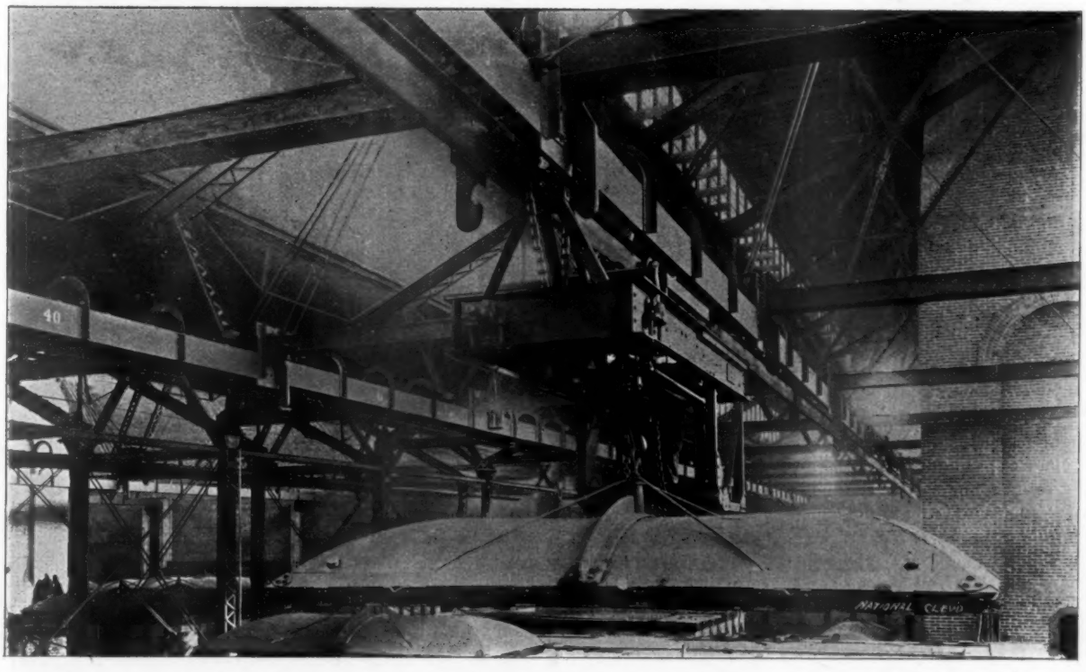

FIG. 1.—THE BROWN HOISTING AND CONVEYING MACHINE COMPANY'S ELECTRIC TRAVELER AND SUSPENDED BEAM TRAMWAY, IN THE NATIONAL CARBON COMPANY'S PLANT.

The system consists of an electric traveling hoist running on a suspended beam track. The main features of the hoist are as follows: The traveling hoist is suspended from four axles, with track wheels, which run upon a track made of 10-inch channels, with the flanges inwards. These channels are spaced about a foot

apart. One pair of these axles are drivers. The motor is a 10 horse-power Brush, mining type, designed for 220 volts. This motor is sufficiently powerful to slip the drivers. The load to be lifted weighs from three and one-half to four tons. It is a furnace top and a very bulky thing to handle. The man who rides with the machine is able to reach down and hook on the load; he then applies the power and the load is raised. Having raised the load to the required height, he then uncouples one clutch and couples in another, and the machine is ready to travel along the track, carrying its load. In regard to the speed of this machine, it is anything that the operator may choose; that is to say, that the possible speed is far above the safe speed. The load is carried probably at about 200 feet per minute. If, however, the track were long enough, he could easily reach a speed of 500 feet per minute, and even much greater. The speed of hoisting is very much slower, but as the distance which the load is required to be hoisted is very small, say, about five feet, the time occupied in raising the load is but a very few seconds. The motor is reversible, and is reversed whenever it is necessary to run the machine in the opposite direction or lower the load. The current is communicated to the machine by means of two trolley wires, one on either side of the channel iron track. Where the wire passes the machine it rests upon a shoe or sliding contact, which, being a little higher than the insulating supports upon which the wire rests, it lifts the wire off from the supports as the machine approaches one of these supports, and the wire is again laid down upon its support after the machine has passed. The building in which this machine is placed is 205 feet wide at the widest point and 325 feet long.

There are 12 channel iron tracks running north and south, which are attached to the under side of the bottom chord of the roof trusses. Four of these tracks are 140 feet long and eight of them are 203 feet long. Running east and west along the north side of the building there is a transfer track which is 325 feet in length and of 20-foot gauge. Running on this transfer track there is what is termed a transfer car, which simply consists of a section of channel iron track 20 feet long, supported upon four track wheels, which run on the transfer track. The operation of this transfer track may be described as follows: The traveling hoist, being upon one of the north and south tracks, is run onto the transfer car and locked so that it can not be run off.

This transfer car is locked to its position so that it registers with one of the north and south tracks, and it can not unlock until the traveling hoist is in position upon the transfer car. When the traveling hoist runs upon the transfer car it automatically couples the machinery of the hoist onto the machinery of the transfer car, and after the traveling hoist is locked in its position on the transfer car and the transfer car is unlocked, then the power of the motor can be applied to running the transfer car in either direction. The transfer car may then be run until it registers with any one of the north and south tracks, and the traveling hoist can not be moved off from the transfer car until the transfer car is again locked; then the traveling hoist is run off onto the track as desired. These north and south tracks run over the center of the various furnaces, and a furnace top may be picked up, carried and placed upon any other furnace.

These furnaces are used for baking electric light carbons. The furnace top is placed on it and luted to its position with clay, and the heat is kept on for about four days, which brings it to a white heat. The heat is then turned off and the furnace top is raised by the hoist a few inches to allow the air to enter around it, so as to assist in cooling off the furnace. After the furnace is cooled for perhaps one-half day or more the furnace top is picked up and carried to some other furnace which is ready to take its heat. This makes it necessary for the whole machine frequently to pass over furnaces which are at a very high heat. Soon after this machine was started the Brown Hoisting and Conveying Machine Company were advised that it was out of order, and they found that the heat was so great that the hard rubber bushings used in bushing the electric wires through the iron work were melted, and were of no use. They found it necessary to use porcelain or vulcanized fibre bushings. The carbons are packed in these furnaces in sand, and this sand is removed whenever the furnaces are emptied. It is then very dry and dusty; besides being hot. A large sand bucket is placed in the furnace and loaded with the sand and the hoist is used to lift this bucket, which holds about 30 cubic feet of sand. The hoist is also used to bring the unbaked carbons to the furnaces and to take them away, although they are frequently brought to the furnaces and removed by other means. It may be seen from the above that the machine is subjected to very hard use. In the first place, it was turned over to a perfectly green man, who proceeded to operate it in a manner suggested by himself. He was unable to injure it, however, as it was electrically protected by fuses, and the mechanism was strong enough to resist any mistakes which he might make. Furthermore, everything about the furnace room is more or less covered with sandy dust, which is about the worst possible dust for machinery. Carbon dust is there in abundance, which is the worst possible dust for electrical apparatus, and in addition to the above, the heat is frequently suggestive of the "infernal regions." The whole apparatus has given excellent satisfaction.

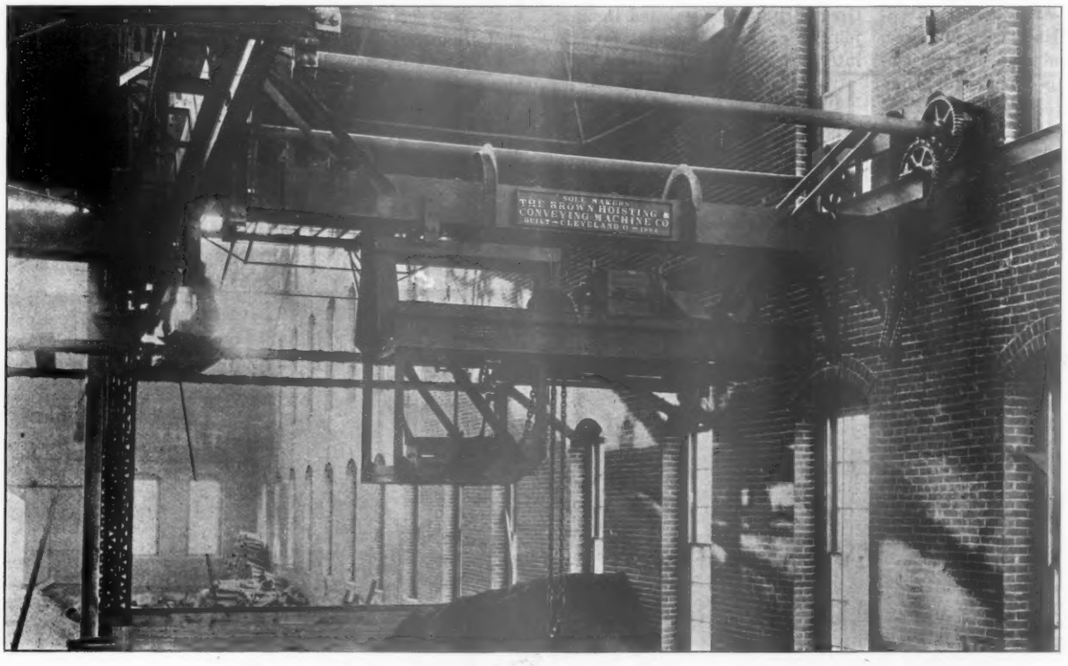

FIG. 2.—SIDE VIEW OF ELECTRIC TRAVELER.

Horseless Carriages in England.

[*From London Industries and Iron.*]

Sir David Salomons has all the indefatigability of the enthusiast in his crusade in support of the evolution of the motor carriage. He has now been successful in forming a powerful association for the purpose of bringing Parliamentary influence to bear on the government, with the object of removing the legal disabilities under which this class of conveyance now labors in this country. Sir David Salomons is of the opinion, however, that sweeping improvements are required in the existing types of self-propelling vehicles before they can be regarded as fitted for general public use. It is satisfactory to note that the new president of the association has a sufficient and even superabundant faith in the ability of native mechanicians, and expresses the belief that in this department of vehicular transport we shall take our place well in advance as soon as the time comes.

Scribner's Magazine enters upon its tenth year with several new departments and a most promising outlook for interesting features. What most readers will first turn to is the long-expected serial by J. M. Barrie, his only fiction since the publication of "The Little Minister," four years ago. In these times of prolific novelists it is unusual for one of the most popular of them to show the reticence exhibited by Mr. Barrie. A reading of this first long instalment of "Sentimental Tommy" (25 pages of which are given) will convince every one that Mr. Barrie has produced a masterpiece.

ELECTRIC LIGHT FLASHES.

The citizens of San Leandro, Cal., are agitating the question of a municipal electric lighting plant.

The Edison Electric Illuminating Company of New York has declared a quarterly dividend of one and one-fourth per cent, payable February 1.

J. D. Bennett, of Brooklyn, N. Y., receiver of the Rockaway Electric Light Company, which has its plant at Rockaway Beach. The liabilities of the company are $100,000, and there are only $15,000 in assets. The receiver's bonds were fixed at $5,000.

electric plant for lighting Philadelphia was much discussed by a subcommittee of the electrical committee at a meeting last week. It was not determined where the electric light plant will be placed. The basement under the City Hall courtyard is not large enough.

A Receiver for George F. Woolston.

Samuel F. Jacobs has been appointed receiver in supplementary proceedings for George F. Woolston, constructor of electric light plants and waterworks, of 40 Wall street, New York city, on the application of

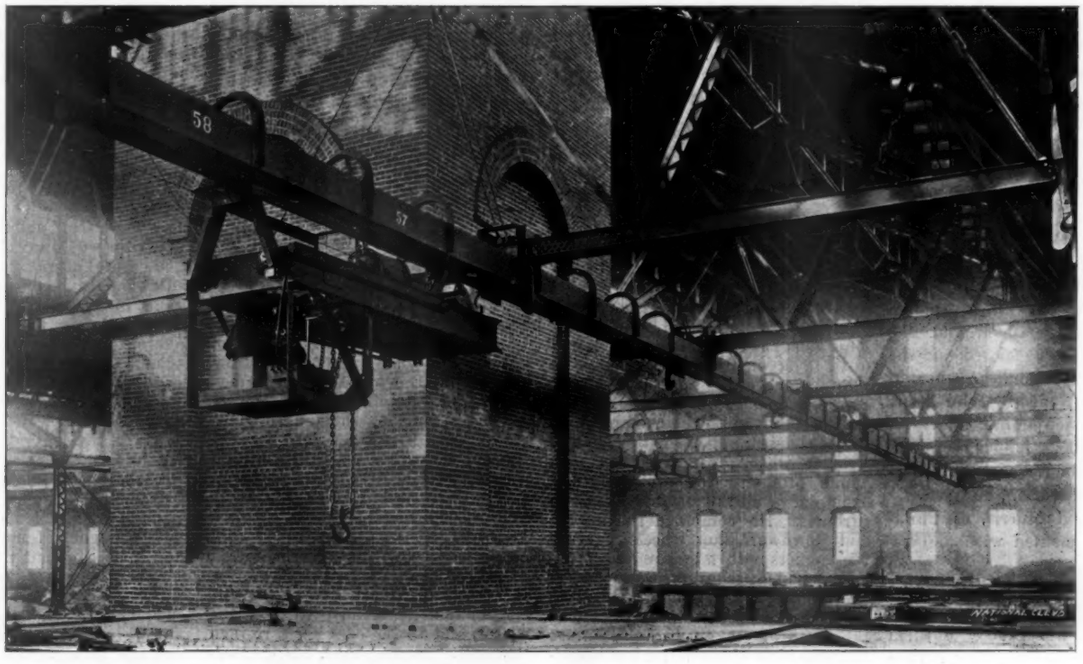

FIG. 3.—ANOTHER VIEW OF ELECTRIC TRAVELER AND SUSPENDED BEAM TRAMWAY.

A syndicate of Eastern and Western capitalists have purchased the plant of the Seattle, Wash., Gas and Electric Light Company for a reported price of $750,000.

Livingston M. Combes, aged 28 years, employed by an electric light company in Amsterdam, N. Y., was instantly killed on December 26 while at work on a lamp which failed to

The McKeesport, Pa., Light Company is said to have held a meeting and decided to cut off every electric street lamp in McKeesport in case the councils of that city award the

the George F. Blake Manufacturing Company. Mr. Woolston is manager of the Mutual Finance and Construction Company, to which he turned over his contracts for electric light plants at Kearney, N. J., Snake Hill

FIG. 4.—SUSPENDED BEAM TRAMWAY AND TRANSFER TABLE.

The street lights at San Bernardino, Cal., were shut off on the night of December 15 because the city authorities rejected the local electric lighting company's bid of $7.25 per light for 18 6 as against $5.95 for 1895.

Chancellor McGill has appointed

burn. The only mark on the body was a scar on the chin. An effort was made to resuscitate the man, but without avail.

The resolution which authorizes an appropriation of $100,000 to be used for the establishment of a municipal

contract for 1896 to the Altmeyer Electric Light Company, which has underbid the first named by $20 per lamp. The McKeesport company contends that the Altmeyer company is a "paper" concern, and has, therefore, no legal standing.

and the Hudson County boulevard. His assets consist of $350,000 stock of the Helena Consolidated Water Company, all but $75,000 of which has been hypothecated; $10,000 stock of the Marshalltown Quarry and Stone Cutting Company, and some lots in Helena and Fort Benton, Mont.

WATER POWER—ITS GENERATION AND TRANSMISSION.

READ BEFORE THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS, NEW YORK, DECEMBER, 1895, BY SAMUEL WEBBER.

(Concluded from page 364.)

Similar improvements were early made in the mountainous districts of France, where metal buckets, curved either vertically or horizontally, were bolted to a central shaft, and were known either as "*rouets a cuve*," or "*rouets volants*," and in common parlance with us were known as "tub wheels." The water was applied to all these wheels "tangentially" by a trunk or spout, which delivered it at the circumference. Next, this trunk was made in the form of an Archimedian scroll, which applied the water equally all around the wheel, the top being closed and the discharge at the bottom. A wheel of this short was patened by John Tyler, grandson of "Benjamin," above referred to, in 1855. I have no record of the dates of the European improvements in this direction, but, as early as 1843, Elwood Morris, of Philadelphia, experimented with and reported on what is generally known as the "Jonval turbine," in which the radial buckets are curved vertically, and the water directed to them by a set of stationary guides curved in the opposite direction, and fixed to the interior of the tube or feeder which supplied the water. This form of wheel has also been known as the "Koechlin" and as the "Froment" turbine; the name of "Jonval," I believe, only applies properly to the "draught-tube" arrangement, which was patented in this country by Zebulon and Amasa Parker, of Licking, Ohio, in 1840.

These wheels were sometimes, in cases of low heads, set directly in the bottom of the wooden flume or forebay; in other cases supplied by an iron feeder pipe. The Froment turbine, which the writer saw in the London "Crystal Palace" of 1851, was of the former character, and the gates were a series of "plungers," which fitted down between the guides. J. P. Collins, of Norwich, Conn., has adopted this form of gate; others, as Mr. Geyelin, of Philadelphia, have used what is known as the register gate, a term derived from the common hot-air heating apparatus. Still another form has been a sliding telescopic tube, outside, which throttles the water after leaving the wheel, and seems to the writer objectionable, but has been applied to the turbines at Niagara.

This class of wheels, known as the "downward flow," has proved effective and economical, and they are particularly suited for large and constant powers at low heads, but are deficient at partial gate, if the gate is of the register or telescope pattern. The writer has obtained 84 per cent net effect with two "Geyelin" turbines in different localities, when at "full gate."

We must now turn to a different form of wheel, the "inward flow," patented in 1838 by Samuel B. Howd, of Geneva, N. Y. In this the action of the Fourneyron wheel is reversed, and the converging guides, which were straight, were placed outside the wheel, which had curved buckets, revolving inside the guides, and was, in fact, only one form of the old "tub wheel." Mr. Francis has stated (see Hydraulic Experiments") that a similar wheel was suggested by General Poncelet in 1826.

In the Howd wheel the regulating gates were placed outside the guides or "chutes." The buckets were cast iron, fastened by bolts to wooden top and base plates, and the discharge was central.

In 1849 Mr. Francis took this matter up, and built, for the Boott mills in Lowell, an inward-discharge wheel, in which he employed the carefully designed curves of the "Boyden" wheel, and which gave excellent results, nearly equal to those of the outward discharge.

This type of inward discharge gave much greater facilities for operating the gates, and was followed by a number of variations, notably the "American Turbine," of Stout, Mills & Temple, of Dayton, Ohio, in which the form of gate adopted gave much better results than were obtained when partially closed, by the cylinder between the guides and buckets, which Mr. Francis copied from Mr. Boyden. This wheel at the Boott mills lasted until 1875, when it was replaced by a "Swain wheel." In 1855 A. M. Swain, a mechanic, who had been employed at the Lowell machine-shop in the construction of the Boyden and Francis wheels, conceived an idea which produced the prototype and exemplar of all the modern American turbines. He combined the inward and downward flow wheels, curving the buckets both laterally and vertically, and discharging the water mainly downward, where a reversed curve in the base on which the wheel rested threw it outward again, so that the path of the water was a semicircle. He adopted a form of gate which, instead of cutting off the water abruptly, closed the orifice by which it entered the wheel, by lifting the lower side of the tube, so as to contract the passage, which still retained a rounded aperture. The result produced by this was marvelous; instead of 30 per cent effect at part gate, or half water, he got 66 per cent, and 83.4 per cent at full gate, when the wheel was finally perfected in 1875.

The Swain wheel had, however, given an excellent result as far back as 1862, and from that date down to about 1878 the number of turbines was legion, in all sorts of variations of curve of bucket and form of gate, but all containing the same general features of inward and downward discharge. Of these, the Leffel wheel combined both forms of bucket, separated by a diaphragm in the same wheel, and has given excellent effects.

The general result of this change from the Fourneyron type, as first introduced, has been to furnish the public with turbines of equal power, in one-half the space and at one-fifth the cost, being single castings of iron or bronze, instead of built up of many parts. The general line of evolution, beginning with the Swain wheel, has been that of fewer and deeper buckets, with wider openings, to avoid obstruction by floating matter, and in some of the wheels, like the Hercules, the narrow openings of the "chutes" have been retained, preventing such matter from entering the wheel itself.

This latter wheel brings us to the date of 1876, when what is known as the "new-departure" wheels were introduced. The first of these was the "Hercules," designed by John B. McCormick, of Brookville, Pa., who brought it to the Holyoke testing flume to be tried, and the results were such that the Holyoke Machine Company at once entered into its manufacture.

The principal feature of this wheel was a much smaller diameter, with longer buckets and deeper openings, for any proposed amount of power.

This wheel was at once followed by the "Victor," made by Stilwell & Bierce, of Dayton, Ohio, on the same general lines, but differing in form of bucket and gate; and many of the older wheels have been since changed or improved in the same direction; and the following table will show the difference in quantity of water used and power obtained by a number of wheels of nearly the same diameter, under the same head of 26 feet, beginning with the "Boyden Fourneyron" and ending with the "Victor":

	Inches diameter.	Cubic feet water per second.	Horse-power.
Boyden Fourneyron	36	22.95	55
Risdon	36	35.45	80
Risdon "L. G."	36	46.27	121
Risdon "D. C."	36	80	199
Leffel, standard	35	40.45	96
Leffel, special	35	60	148
Tyler	36	40.7	95.8
Swain	36	58.2	140
Hunt, "Swain bucket"	36	48.8	121
Hunt, new style	36	96	239.74
Leffel, "Samson"	35	109.1	264
"Hercules"	36	107.6	253.5
Victor	35	108.8	266

This enormous difference in productive effect in wheels of the same diameter shows the great economy of the later type of turbines, particularly as all the wheels above named have a proved efficiency of 80 per cent, and some of them have given more; such as 87 per cent for the Risdon, tested by Mr. Edward Sawyer, of Boston, at Crompton, R. I., and by the writer at the Centennial; 87 per cent for the Hercules, tested by Professor Thurston; 84 per cent for the Collins, by the same authority; 84 per cent nearly for the Swain, by Mr. Francis; 84 per cent for the Geyelin and the Hunt, tested by the writer, and 88 per cent for a 15-inch "Victor," by the same, but this was so small a wheel that the test cannot be depended on. Later tests of large wheels at the Holyoke flume give over 80 per cent, and to these may be added the "Success," of E. Morgan Smith, York, Pa., and the "Humphrey," Keene, N. H., and the wheel of Gates Curtis, of Ogdensburg, N. Y., also the "New American," of the Dayton Globe Iron Works, Dayton, Ohio. Here all questions of selection must be governed by other reasons than that of mere efficiency, as all the above 17 wheels have been proved to give 80 per cent or over net effect. Nearly all these wheels have been adapted to horizontal shafts for high heads, where the belt pulleys can be kept out of water, and, so far as they have been tested, show no difference in economy from that given on vertical shafts. A "Hunt" wheel, tested by Mr. Francis *in situ*, in a mill at Lowell, only varied a fraction of one per cent on a horizontal shaft from the result obtained on a vertical one by Mr. Herschel at the testing flume in Holyoke.

While the writer has expressed a preference for the "downward-flow" wheel when the head was low and bevel gears necessary, he would prefer the new type of small-diameter wheels for horizontal shafts under high heads, as they give a greater initial velocity to the shafting, the friction of bevel gears is avoided, and if set in pairs, to thrust against each other, step friction, which is very destructive in muddy streams, is also done away with.

The first instance in which turbines were placed in pairs in this manner, in the writer's memory, was in 1875, when A. M. Swain installed a pair at Ticonderoga, N. Y., which were very successful. Since then all the prominent wheel builders have adopted it, and it has become very general in all cases where the head was sufficient to keep the pulleys out of water. It also gives the advantage of easy and immediate access to the wheel for examination or repairs, by a manhole in the case, if the head gates to the feeder are closed. The writer installed a pair of Risdon turbines for the Nashua Manufacturing Company in this way some time since, and, asking the man who had charge of them, after two years' use, "If anything had been required to be done to them?" he answered, "Nothing but to oil the stuffing-boxes, and open and shut the gates." Like all other water-wheels, the turbine is somewhat slow in answering to regulation under a variable load, as it takes more time to open and close the gates than it does to trip the "cut-off" in a Corliss engine, but both the "Snow" and "Schofield" governors are very effective and can be recommended.

Among the other points mentioned in the schedule is the testing of turbines "*in situ*," and in regard to this the writer would say that a few points need careful attention. The friction pulley should be flanged, to keep the brake in place, and amply strong, and a safe size for it is to allow one square foot of surface motion per second for every 3,000 foot-pounds per second lifted; this gives a pressure of a little over 20 pounds per square inch. The brake should be of timber, fitted to the pulley, one third the circumference on each edge, leaving two openings of one-sixth circumference for lubrication. The best lubricant is strong, thick soapsuds, about the consistency of molasses, and this should be constantly fed from a can or cans in a stream the size of a quill, and may be diluted in use by a jet of cold water from a hose or pipe, played in through the openings, to cool the pulley. The brake lever is most convenient if made the radius of either a 33-foot or a 66-foot circle, that is, practically, 5 feet 3 inches or 10 feet 6 inches long from center of shaft to point of attachment of weight. The whole apparatus should be perfectly balanced at rest before commencing operations.

With a worm shaft and gear, tapped in to the wheel shaft, so as to ring a bell every 100 revolutions, the speed is ascertained, and the weight in the scale being known, the horse-power is quickly calculated. Professor Thurston's paper on "Turbine Testing," in Vol. VIII of the Transactions, and Mr. Francis's "Hydraulic Experiments" give data as to the measurement of water, if the net effect of the wheel is also to be arrived at, but it would cover space unnecessarily to go into those details here.

When we come to the matter of cost, we find it to vary much in different localities, according to the expense of development. The cost at Lowell, when the first "mill powers" were opened, had been only $40 per horse-power for dam, land and canals. This was increased $50 per horse-power by the new canal, which gave more certain head, and enabled the mills to use the surplus water, which ran to waste part of the year, and the total cost has probably been $100 per horse-power, to which another $100 is to be added for the expensive Boyden wheels and massive masonry pits. At Augusta, Ga., the canals, nine miles long, cost the city, which leases the power, $90 per horse-power. At Columbia, S. C., for five miles of canals the cost to the city has been $72 per horse-power.

In many cases of smaller enterprises it has been less than $50 per horse-power, and the total cost, including wheels and pits, less than $100; and we will now give the data of the cost of water power as developed within recent years at three different points, showing the outlay, and a fair allowance for interest and running expenses:

The first instance we shall give is that of the Concord Water Power Company, on the Merrimac River, at Concord, N. H. Here the power developed is at a minimum 3,300 horse-power, on an average 5,000 horse-power from a fall of 22 feet. The wheels are "Rodney Hunt" turbines, set in pairs on horizontal shafts, of 400 horse-power each. The cost has been as follows:

700 acres land and flowage rights ...	$20,000
Dam and abutments ...	141,015
Canal, 60 feet wide ...	27,363
Head gates ...	16,675
Waste weir ...	5,220
Making an investment for water of ..	$210,273

or $63.72 for the minimum amount of power, or $42.05 for the average amount of power. To this is to be added pits and foundations put in for 2,000 horse-power, $15,000, or $7.50 per horse-power; wheels put in for 1,600 horse-power, $12,225, or $7.66 per horse-power, making a total, for the minimum flow of water, of $78.88 per horse-power, and for the average flow, of $57.75 per horse-power.

Now, if we base our calculation of cost on the minimum flow, and allow interest, five per cent; sinking fund, two and one-half per cent; repairs, one and one-half per cent; taxes, etc, one per cent, we get a total annual cost of 10 per cent, or $7.89 per horse-power, to which add oil and attendance, 75 cents, making $8.64.

As this power is to be transmitted in part, at least, to Concord by electricity, the cost of such transmission, also leased at a rental of $5 per horse-power. For quantities less than 500 horse-power the charge is $7. The fall is 27 feet and the power is furnished by Victor turbines, on horizontal shafts, and is transmitted by electricity to the mills.

Quicksands made the wheel-pits very expensive, by the quantity of concrete masonry required, so that for all expenses of pits, races, power-house, etc., we have $55,000 for 2,000 horse-power. The wheels cost $20,000 more, so that we have a total expenditure of $75,000 for 2,000 horse-power, or $37.50 per horse-power. This, at 10 per cent, as before, gives $3.75 per horse-power; water rent, $5 per horse-power; attendance and oil, 75 cents, making a cost at wheels of $9.50 per horse-power.

As the water rent paid in the last two cases covers interest and depreciation, while the cities which furnish the water also obtain their own supply for other purposes, it will be seen that it covers the cost, and that the estimate of Mr. Samuel Batchelder, 50 years ago, that the cost of water-power in Lowell, including land, was under $15 per annum per horse-power was substantially correct, and will cover the cost of water power with modern turbines, under fair circumstances, to-day, with plenty of room to spare for heating.

The writer trusts that these notes may be acceptable to the society, and that they may draw from some of the other members, who have paid more attention to that question, fuller details as to the cost of "water storage," and possibly some other facts in the history of the turbine which have not come to his knowledge.

The Brownell Automatic Governor.

The accompanying illustrations show the governor used by The Brownell & Company, of Dayton, Ohio, on their automatic engines. Fig. 1 is a view of the complete governor. Fig. 2 shows the main eccentric removed, showing the pin bolted to it, which fits into the hole in the auxiliary eccentric yoke. Fig. 3 shows this auxiliary eccentric yoke removed. The springs are also removed in this view.

As will be seen, the governor has the usual arrangement of weights and springs, and belongs to that class of governor in which the eccentric swings from a fixed point. The principal feature of the governor is the manner in which the motion of the weights is transmitted to the main eccentric. As is shown in Fig. 3, the weights are connected by links to the ears of the auxiliary eccentric, which is fitted to turn upon the hub of the governor wheel, so that as the weights are moved the auxiliary eccentric is turned around the shaft. This auxiliary eccentric is fitted with a yoke or strap, which is shown in position in Fig. 2 and removed in Fig. 3. In this yoke is a hole which receives the pin bolted to the main eccentric in Fig. 2. Thus, as the auxiliary eccentric is turned around the shaft, its yoke is thrown across, carrying with it the main eccentric, which is thus moved nearer to or farther from the center, and thereby decreasing or increasing its throw.

The advantages of this combination of eccentrics are that the governor is mechanically locked in every position it assumes, and can only be moved by pulling on the weights, the pull of the valve having no effect whatever, while at the same time the governor is free and certain to act, sensitive, strong and durable.

To reverse the governor, the pin bolted to the main eccentric is changed to the holes shown on the opposite side in Fig. 2, the weights and springs are changed to the holes provided for them, and the operation is complete. The governor is compact, yet all adjustable parts are very accessible. All wearing parts are circular in form, thus insuring smooth, uniform wear. The entire wear of the governor is taken up by two simple adjustments. The governor was designed and patented by H. C. Clay, superintendent of the engineering department of The Brownell & Company.

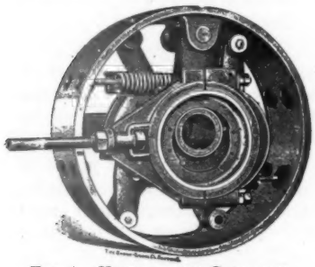

FIG. 1.—VIEW OF THE COMPLETE BROWNELL GOVERNOR.

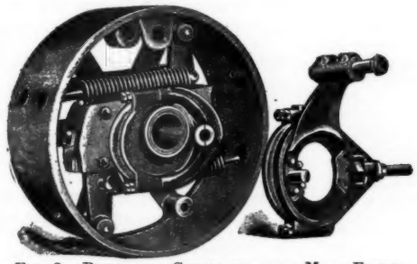

FIG. 2.—BROWNELL GOVERNOR WITH MAIN ECCENTRIC REMOVED.

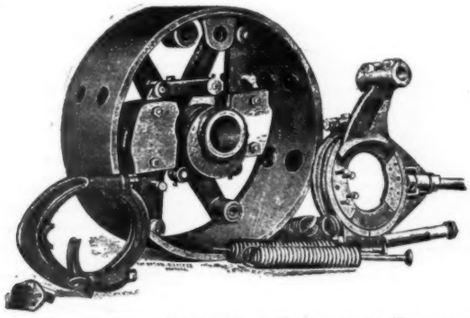

FIG. 3.—BROWNELL GOVERNOR WITH AUXILIARY ECCENTRIC YOKE REMOVED.

The Ohio Storage Battery Company.

The Ohio Storage Battery Company, of Cleveland, Ohio, are the sole manufacturers, under an exclusive license, of the Ford-Washburn Storelectro Company's storage batteries, for whose merits they make some very strong claims. One of the last acts of the late Franklin L. Pope was the preparation of an elaborate opinion to the effect that the patents covering the Ford-Washburn battery do not infringe in the slightest degree any other storage battery patents.

The Ohio Storage Battery Company are willing to back up this statement to the fullest extent, and will protect any of their customers from litigation.

The company make a specialty of manufacturing storage batteries for isolated plants for house lighting and cells for surgical, telegraph, telephone and phonographic uses. Small cells are also made to order. The company claim that theirs is the only storage battery that ever successfully operated a street car in Winter as well as in Summer.

They also state that their batteries will soon be used in another railway installation that will attract considerable attention.

The Ohio Storage Battery Company have received some very strong endorsements of their batteries, and are pushing their business in an intelligent and progressive manner.

Another Underground Trolley Road for New York.

The lease of the Eighth Avenue Street Railway Company's lines to the Metropolitan Street Railway Company, of New York city, has been ratified. The lease will run for 99 years at an annual rental of $215,000. The Metropolitan company takes possession of the road January 1 and will change it over to an underground trolley system.

Is the Company Insulated, Too?

The Boston Electric Insulated Pole Company has been organized at Portland for the purpose of manufacturing, doing business in and erecting insulated poles, upon which wires may be strung, with $100,000 capital stock, of which nothing is paid in. The officers are: President, Edward E. Drew, of Boston, Mass.; treasurer, George E. Macgowan, of Portland.—*Augusta, Me., Journal.*

on which I do not assume to be authority, will have to be added to this. If, on the other hand, it is to be partially used near at hand, it is safe to say that the cost of transmission by shafts and belts would not increase it to over $10 per horse-power.

If we assume the average flow of 5,000 horse-power the cost of the power at the wheels would be only $5.72, but we should then require the additional expense of a steam plant and its operation to produce the 1,700 horse-power deficiency at low water.

We will now take a large southern mill, the John P. King, at Augusta, Ga. Here the water is purchased of the city at a rental of $5 per annum per gross horse-power.

The wheels are three Geyelin turbines, on vertical shafts with bevel gears, estimated at 1,835.5 gross horse-power. These wheels, by my own test *in situ*, netted 84 per cent. Calling the average 80 per cent, it gives 1,468 net horse-power. This cost of plant was for wheel-pits 42 feet deep, in rock, head race, 200 by 40, tail race, 800 feet to river, about $25,000, and the wheels and jack shaft cost the same, or $50,000 in all. This, for 1,468 net horse-power, is $34.20 per horse-power, or, at 10 per cent, $3.42; water rent, $5.50 on 1,835.5 gross horse-power, equal, net, $6.88; attendance and oil, 75 cents, making a total cost of $11.05.

The next case is also a southern one, that of the Columbia mills, at Columbia, S. C. Here the water is

Electric Light and Health.

Electric lighting has made numerous contributions to sanitation. Dr. Saunders, medical officer of the London Board of Health, says that it has done much toward making the employés of commercial and manufacturing establishments healthier. "Faces that were pale and wan from work in gas-lighted basements, stores and shops are much improved since the introduction of electricity. The heat from the gas jets and poor ventilation are responsible for much sickness. It is also shown that in the same city the electric light has lessened crime. Darkness breeds wickedness and light dispels it."—*Literary Digest.*

The Southern New England Telephone Company has perfected its State service to all points in Connecticut. The system is equipped with metallic circuits and improved instruments and toll stations are located in all towns. The rates from 7 A. M. to 6 P. M. are 25 cents and from 6 P. M. to 7 A. M. 15 cents.

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SPECIAL NOTICE TO ADVERTISERS.

***CHANGES** for advertisements must be in this office by Friday noon for the following week's issue.*
***NEW ADVERTISEMENTS** should be in the office not later than Saturday noon to insure publication the following week.*

NEW YORK, JAN. 1, 1896.

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HAPPY NEW YEAR!

The present issue of the ELECTRICAL REVIEW marks the beginning of the twenty-eighth volume of the oldest electrical weekly in the United States and bears the date of the first day in 1896. To all our friends we wish a Happy and Prosperous New Year, and we beg to assure them that we will do our best, with their assistance, to make the ELECTRICAL REVIEW even a better paper than it was last year. Send us at any time any item of electrical interest which comes under your observation—send us, also, if you haven't done so already, three dollars for a year's subscription to the newsiest and best-read electrical paper published.

Until the courts finally decide the case, Simon Sterne, of this city, can use an inferior telephone. An injunction against removing a grounded-line instrument from his office and replacing it with a metallic-circuit instrument has been granted. Under the message-rate system the cost of the improved instrument would scarcely exceed the rental of the old one, yet there was a principle involved, and, therefore, the antiquated telephone may continue to adorn our distinguished friend's office to the annoyance of the Metropolitan Telephone Company and of all who have to transact any business over the telephone with the unprogressive Sterne. We shall await with interest the outcome of the case.

A few months ago the ELECTRICAL REVIEW advised the Brooklyn Bridge management to put in electric lights. Thanks to the foresight and energy of Mayor Schieren the bridge cars were soon brilliantly lighted by this modern illuminant. Two weeks ago the ELECTRICAL REVIEW advised the management to install a telephone signaling system by which to run the bridge trains. On Saturday of last week the experiment was successfully tried, and it is now announced that the telephone system for signaling to the moving trains will be permanently installed. The Brooklyn Bridge trustees evidently read a good electrical journal.

It is proposed to have Chief Engineer Buck, of the new East River Bridge, confer with an electrical engineer regarding the introduction of electricity as the railway motive power of the bridge. This is a start in the right direction. Electric cars are the proper means of transit on bridges.

WALL STREET AND THE ELECTRICAL STOCK MARKET.

The past week in the security markets has been a period of recovery. Prices rebounded all the way from 50 to 80 per cent. The movement was natural, and as such occasioned no surprise. The war scare, which caused the first slump, is about over. Its effects, however, will continue to be felt for some time. Liquidation, sure to follow the two movements outlined, is now taking place, and prices have begun to sink to a lower level. A number of new elements entered the situation. One was the refusal of New York banks to pay out greenbacks to foreign exchange houses, the idea being to check gold exports. A part of their programme was the authorization of Clearing House certificates, with which they calculated to discharge their function as depositories, should there be an excessive demand for balances from this source. Later in the week, upon more definite knowledge regarding a bond issue, and the more rational views entertained by foreigners, the banks abandoned this line of tactics and allowed shippers to have all the currency desired. It is generally admitted that a large government loan is to be floated within a comparatively short time, and that all the preparations therefor have been made. The delay up to date has been caused by a desire on the part of the Administration to allow Congress to act in the premise. The House of Representatives took the matter promptly in hand. The Senate's attitude, while uncertain, is believed to be one of delay. The moment this is demonstrated the bonds may be looked for. Their appearance will have a reassuring effect. Wall Street has not given up the hope that there will be comprehensive currency legislation by this session of Congress, but does not look for anything comprehensive until well into the Spring.

General Electric's recovery has been only partial. From 20, the low of last week, it rebounded to 27 and then reacted about 2¼ per cent. Western Union's price on Thursday was 87¼, a practical recovery from low. Yesterday, on rumors that necessities of Baltimore & Ohio would force it to sell 50,000 shares of Western Union held as a treasury asset, caused the stock to decline to 83½. There was a partial recovery on Saturday. Edison Electric Illuminating of New York recorded transactions of a small lot at 94¼. This is hardly regarded as a market for the stock. The old bonds sold at 107 and 106.

The Edison Electric Illuminating Company of New York declared the regular quarterly dividend of 1½ per cent, payable February 1st, to stock of record January 15.

American Telegraph and Cable Company sold at 92½ and 91½.

American Telegraph has declared a dividend of 2½ per cent, payable January 13. Books close January 4.

There was a substantial recovery in Bell Telephone on the Boston Exchange this week. On Monday the

bid price was 190 and on Friday 202. Other telephone stocks showed strength, Erie advancing from 57 to 61½. New England was stationary at 85. Westinghouse securities recovered somewhat. The preferred is quoted at 54 @ 55 and the common at 30 @ 33. The high price for Electric Storage stock was established in Philadelphia on Thursday, it being 30 for the common and 31 for the preferred against 22 and 23½, respectively, on Monday.

The affairs of the Edison Electric Illuminating Company of Philadelphia are in something of a tangle. It will be remembered that the Pennsylvania Heat, Light and Power Company consummated an agreement with the majority of the directors of the Illuminating company for a lease on terms set forth in the ELECTRICAL REVIEW at the time. The move was a part of a plan of the Electric Storage Battery Company to extend its field of operations in the direction of illumination. It was shown at the time that the lessor, by employing the plant of the lessee during its idle hours in filling storage batteries, could return a much larger net revenue than the illuminating company is now earning. Professor Marks, president of the company, has opposed the lease on the ground that he did not like the financial methods of the Pennsylvania Heat, Light and Power Company, nor the security which it offered, that dividends would be paid. A meeting was held in Philadelphia this week to ratify the lease. The point was raised that the common council had not yet authorized the company owning underground conduits to lease any part or all of them to other companies. Such a measure is pending, and its enactment is necessary in order to validate the lease. Stockholders upon their *viva voce* vote defeated the lease proposition. It is understood that as soon as the necessary legal authority is secured the measure will go through. BAIN.

New York, December 28, 1895.

The Electric Potential.

At the January meeting of the Electric Potential Club, of Boston, Mr. Addicks, engineer of the Bay State Gas Company, will read a paper on "Acetelyne Gas." It is expected that a large number of the electrical and gas engineers in the New England States will be present and discuss the paper, and the meeting will be held some time between the 15th and 25th of January. The exact date will be announced later.

Boynton Multivolt Battery Company.

The Boynton Multivolt Battery Company, formerly at 10 to 14 Whipple street, Brooklyn, N. Y., begins the new year by removing its business to New York city. The company is now established at 169 Greenwich street, corner of Cortlandt street, where its friends and customers will find a cordial welcome.

A New Year's Eve Dinner.

A large number of invited guests attended the dinner given to the employés of A. K. Warren & Company by Mr. A. K. Warren. The passing of the old year was fittingly celebrated at the Maison Francais on Washington street, near Hubert.

OPENING OF THE NEW SESSIONS FOUNDRY.

CONNECTICUT'S GREAT PLANT DEDICATED — PROMINENT PEOPLE PRESENT—DESCRIPTION OF THE NEW WORKS—CONTRACTORS WHO CONTRIBUTED.

The formal opening of the new plant of the Sessions Foundry Company at Bristol, Conn., on Friday, December 27, was the occasion of a most notable gathering of men representing the industrial interests of all sections of the country who desired to see an adoption of the most modern facilities and equipments for this work, and to do honor to men capable of maintaining and expanding an establishment ranking, as it does, with the foremost of New England's manufactories. On the evening previous the company's workmen, with their families, to the number of nearly 1,000, were given a generous entertainment, with suppers and music.

During the day all trains of the New England Railroad stopped at the foundry, and Governor Coffin and many prominent in Connecticut business and social life were visitors. In the afternoon an elaborate collation was served in one of the spacious halls, which will eventually be used as a place of amusement for the employés. The guests were shown through the entire plant and were given the liberty of inspecting any departments.

A few of those present were Hon. O. V. Coffin, Governor of Connecticut; Arthur F. Eddy, A. D. Newton, G. A. Briggs and W. R. C. Corson, of Eddy Electric Manufacturing Company, Windsor, Conn.; H. B. Ham, of Heine Boiler Company, St. Louis; N. Jenkins and G. H. Benham, of Holmes, Booth & Haydens, Waterbury; Mr. Manger, of Huebel & Manger, Brooklyn; Col. Simeon J. Fox, president National Pipe Bending Company, and F. H. Elson, New Haven Boiler Works, New Haven; W. H. Matthews and E. O. Goodrich, of Ansonia Brass and Copper Company, Ansonia; C. F. Barnes, Bristol; E. L. Frisbie, A. M. Dickinson and C. F. Kenworthy, of Benedict & Burnham Manufacturing Company, Waterbury; D. L. Durand, of Birmingham Brass Company, Derby; H. F. Wanning, of Birmingham Iron Foundry; Messrs. Morgan and Bannister, of Bridgeport Boiler Works; Bristol *Press* and *Herald*; E. D. Brown, Hartford; J. T. Case, Bristol; A. A. Coburn, of Coburn Trolley Track Company, Holyoke; Hon. Chas. F. Brooker, of Coe Brass Manufacturing Company, Torrington; W. C. Warren, editor *Commercial Record*, New Haven; E. A. Gordon, of Connecticut Car Service Association; John and Louis E. De La Vergne, of De La Vergne Refrigerating Company, New York; J. H. Grenier, Philadelphia; Wm. A. Harris, of Wm. A. Harris Steam Engine Company, Providence; Samuel W. Sessions, of Lawson & Sessions, Cleveland; M. C. Webster, of the Malleable Iron Works, New Britain; T. H. Fennell, New England Railroad; E. R. Newell, Washington; Chas. P. Clark, president New Haven & Hartford Railroad; Archer Brown, of Roger Brown & Company, Cincinnati; S. H. Goddard, of the ELECTRICAL REVIEW, New York.

A brief description of the plant with its labor-saving facilities will be of interest. On one side of the company's spur of the railroad are large bins which receive the coke and scrap-iron; from this line of bins to the foundry are four small tracks at an angle with the main spur, and on these the raw material is taken on a level to the cupola room and thrown into the cupolas at the top. On the level with the foundry floor are bins for moulding sands. At the east end of the foundry are large rooms for the storage of flasks. Adjoining the track is the main building, 530 feet long, 110 feet wide and 60 feet to the 510 feet of sky-light which runs nearly the entire length, giving perfect light and ventilation. The building is of brick and steel. On the north side are cupola rooms arranged for two cupolas each, making eight when all are in position. At the east end is the large sand pit where the larger castings are poured and one section has a brick-lined well with a Morgan electric crane capable of handling 25 tons. At intervals in the foundry are four hydraulic swinging cranes for lifting smaller castings.

Each workman has a locker and large wash room, and all conveniences are provided for his comfort.

The power is derived from two Corliss engines and conveyed, except for the rumbling department, where direct power is used, to Eddy generators, and thence by 12 motors throughout the buildings. Steam for heating is carried by means of the Sturtevant blower system, changing the air every 20 minutes. At the south side is the imposing, two-story granite building, which contains the rooms for clerical force and the private offices.

The company is a close corporation, comprised of John H. Sessions, the founder, and William E. Sessions. William T. Shepard, who is known in connection with the iron industry of Buffalo, will be the secretary, taking an active part in the management.

Some of the contractors who have contributed to the construction of this splendid plant are: Engineers and architects: Davis & Barnes, 1213 Filbert street, Philadelphia, Pa.; George Palliser, 32 Park place, New York; contractors: Structural steel work, Cofrode & Saylor, Pottstown, Pa.; erected by J. H. Greiner, 1225 Filbert street, Philadelphia, Pa.; heating apparatus, B. F. Sturtevant Company, Boston, Mass.; electric wiring, Electric Construction and Supply Company, New Britain, Conn.; engines, William A. Harris Steam Engine Company, Providence, R. I.; steam pumps, Knowles Steam Pump Works, Boston, Mass.; locomotive, Baldwin Locomotive Works, Philadelphia, Pa.; feed-water heaters, National Pipe Bending Company, New Haven, Conn.; electrical machinery, Eddy Electric Manufacturing Company, Windsor, Conn.; electric traveling crane, Morgan Engineering Works, Alliance, O.; shafting and pulleys, James Hunter Machine Company, North Adams, Mass; cupolas, New Haven Boiler Works, New Haven, Conn.; blowers, Wilbraham Baker Blower Company, Philadelphia, Pa.; telephone system, United States Telephone Construction Company, Philadelphia, Pa.

TELEPHONE NEWS AND COMMENT.

A cable dispatch says that the anti-English feeling in Caracas, Venezuela, is very intense and it has been suggested that the English telephones in the city be replaced by those of American manufacture.

The temporary injunction which Simon Sterne obtained a year ago, preventing the Metropolitan Telephone and Telegraph Company from removing the telephone from his office at 56 Beaver street, New York city, has been made permanent by Justice Ingraham of the Supreme Court pending the action brought by Sterne for the same relief. He is required to give a bond to secure the company from loss of rents and damage, if it should ultimately be decided in the action that he was not entitled to the injunction. The case is a test case, and mainly turned on whether the company has the right to fix rates arbitrarily, or whether it is a common carrier which must take business at such rates as the courts, in the absence of legislative direction, shall hold to be reasonable. When the company changed its service from the grounded-wire to the metallic-circuit system its subscribers were asked to pay a rental of $240 a year for an improved long-distance instrument as against $150 a year for a grounded-wire telephone, only available for local service. Mr. Sterne contended that his old telephone was good enough for him and refused to sign a contract for the new instrument. When the company finally set a day for him to sign a new contract or have his telephone removed he got out an injunction restraining them from doing so. The case was argued last February and Judge Ingraham has since then reserved his decision.

PERSONAL.

Mr. E. H. Forst, proprietor of the California Electric Supply and Construction Company, is visiting New York city and is making his headquarters at the Grand Hotel.

Mr. Clarence E. Stump, who is well known in the electrical field, has been appointed general manager of the electrical exposition which is to be held in New York city, commencing May 4 and continuing until the first of June.

An Important Telephone Decision.

A decision which is considered of great importance by the opposition telephone interests was handed down by Judge Colt in Boston late on Monday afternoon of this week. In the suit of the government to annul the Berliner patent, owned by the American Bell Telephone Company, the court allows the government until May 31, 1896, to take evidence in rebuttal, but refused the Bell company's request to limit the United States in taking evidence on the question of fraud previously raised. It is believed that this decision will let in the evidence on the prior Berliner patent and the Drawbaugh, and possibly other evidence.

Destructors and Central Stations.

[*From the London Electrical Review.*]

Our columns have from time to time borne witness to the great interest taken by central station engineers in the question of refuse destructors, and the hopes that have been entertained that, by adapting these useful sanitary appliances to the purpose of steam raising, a considerable reduction could be made in the cost of this item where a central station and refuse destructor plant were combined. We recently gave some particulars of the St. Pancras and Shoreditch schemes, while the whole question was dealt with very fully for us by Mr. T. Tomlinson some time ago.

Professor Forbes has been, amongst other things, one of the leading exponents of the destructor theory as applied to electric lighting. His footsteps have been followed by Mr. Manville and others, who have also put forward recommendations to certain local authorities that combined electric lighting and destructor plants could be advantageously and efficiently worked. Within the last year or two we consider that this subject has received a rather severe check through the ill-considered statements and claims of a company which held the patents for a peculiar form of Lancashire boiler, and who, on the strength of this, endeavored to persuade the public that what could not be done by a good steam boiler of a recognized type was possible with their pattern. The value of refuse destruction as an economic auxiliary to an electric lighting plant is now, however, being tested on sufficiently broad lines, and the results will soon be widely enough known to enable engineers to form an opinion based on facts, and not, as before, on assumptions and postulates.

In conversation with some of the most experienced central station managers in London and the provinces we have learned that they do not altogether regard refuse destruction as of importance at the present time, except on purely sanitary grounds. On the other hand, Mr. Manville, whose connection with the Shoreditch scheme renders anything he may say of interest, has recently presented a paper to the Northern Society of Electrical Engineers, in which he outlines the position as it appears to him. Since he has put, or is carrying, his theory into practice, we may regard this paper much more seriously than some of those that have preceded it. Perhaps the inclusion of Halpin's thermal storage system into the designs for Shoreditch add to the eagerness with which engineers look for any information regarding this plant. Hot-feed only was accepted when the contracts were let, but we should not be surprised to find that thermal storage proper is taken up at an early stage in the history of this undertaking. Mr. Manville clearly states, what must show municipal engineers that he appreciates the position, that whatever our efforts may be to efficiently utilize the waste heat from destructors to evaporate water, they must always be subservient to the complete and effective destruction of the refuse and the empyreumatic vapors given off by its destructive distillation, and on no consideration must this complete burning be interfered with; otherwise, the refuse could be burned on the fire grates of ordinary boilers, where a higher evaporative efficiency would probably be obtained.

Mr. Manville considers that it is by the utilization of the heat produced by the destruction of ash-bin refuse that we may look to the cost of the production of electricity being materially reduced, and computes the reduction at about one-third of the existing average "works' costs." That anything approaching this figure is to be looked for has yet to be proved in practice. We believe that the utmost at present being got out of the St. Pancras cells, at the the King's Road Station, is sufficient heat for the economizer, and enough to keep a stand-by boiler with steam at 45 pounds pressure. At Ealing, again, the waste gases from the destructor had not, a very short time ago, if our information is correct, been used once for steam-raising purposes, and we could say more on this matter, only we prefer to keep our remarks over for some suitable occasion in the near future. Many engineers, whose experience entitles their views to be treated with respect, have never looked very kindly upon the combination of refuse destructors and electric lighting. It is possible that the combination of refuse destruction, thermal storage and electric lighting may alter these views; at any rate, there are reasonable grounds for concluding that if destructors are to prove of real use, the advantages therefrom will be due to the possibility of certain methods of working being adopted that are made possible by the introduction of thermal storage. Professor Unwin's report on thermal storage must be regarded as an important point in its favor, and where it has been tried the results have been encouraging. Where a destructor is combined with a central station it must not be forgotten that, in the event of the destructor failing to give what was expected, the electricity works are saddled with the expense of extra buildings and plant; while, if the boilers have been specially arranged to obtain the benefits of the destructor gases, and these benfits turn out to be fallacious, the boiler plant would in all probability not work at their best efficiency when coal alone is used.

Destructors can now be worked without nuisance, and Mr. Manville tackles the difficulty at both ends. He would use forced draught to obtain a high temperature, and clinch matters by adding a Jones cremator —*i. e.*, a secondary furnace in which is burnt continuously a coke fire, over which all the gases from the refuse furnaces have to pass, and in which the temperature is raised to the required degree. The low evaporation only of so-called ash-bin refuse is attributed in the paper to excessive radiation from the large masses of brickwork usually forming part of a destructor, and to a too sparing allowance of heating surface in the boilers. Second only to these, Mr. Manville attacks the practice of mixing incombustible matter with refuse, and crediting the mixture with a low evaporative efficiency, and mentions the case of one gentleman—well known in connection with refuse destruction—who has from time to time stated that in his belief no such horse-power as talked about by others could be obtained from ash-bin refuse, but on investigation it was found that this refuse was enormously diluted with street sweepings before it was burned in the destructor.

We have followed this development very closely, and must confess that over-sanguine views seem to have been adopted by many consulting engineers. That during hours of light load a destructor may provide steam, or that even during heavy loads this, combined with thermal storage, may aid economical working, may be accepted, but the advantages are purely financial, and must be judged by a financial balance-sheet. At present, no favorable balance has been shown, and it behooves central station engineers to consult their municipal brethren before entering a new field.

Acetylene.

In a recent issue the *Engineering and Mining Journal* published an article entitled "The Calcium Carbide Gas Bubble," which was reprinted in the ELECTRICAL REVIEW for December 18. These severe criticisms of acetylene gas and the methods adopted by the promoters of the company to boom it have called forth a letter from Mr. G. F. Seward, one of the chief moving spirits of the Willson company and the Electro-Gas company, in which he accuses our contemporary of publishing inaccurate statements. The *Journal* responds, in part, by asking Mr. Seward the following questions:

1. Is it true that there are and can be no patents covering the substances, calcium carbide and acetylene?

2. Is it true that the patent for the Willson process for producing calcium carbide is worthless; that, in fact, the production of calcium carbide in the arc electric furnace is free and not now subject to monopoly, and that it is being produced by others in Europe without any regard to the Willson patents?

3. Is it true that the Willson company, the Electro-Gas company or those interested in promoting them and selling their securities have made public statements, for the guidance of investors, that they can make calcium carbide at from $5 to $7 per ton, or, in more recent statements, at $20 per ton?

4. Is it true that neither of these companies has ever produced or can to-day produce calcium carbide commercially at these figures or at a cost seven times as great?

5. Is it true that neither Mr. Seward nor other gentlemen prominent in these concerns who have known that these public statements were and are absolutely unfounded have ever publicly protested against the use of these statements, or have made any truthful public statement of what it actually has cost and now costs to produce calcium carbide or acetylene by their processes?

In short, are these enterprises selling "rights" which have little or no intrinsic value, or are they able to prove the public statements made for them that they are producing acetylene at figures that give it commercial importance?

In the current number of the *Journal* a correspondent refers to acetylene as follows:

Acetylene gas is a combination of hydrogen and carbon and is the product of the decomposition of calcic carbide and water. Calcic carbide is the combination of calcium and carbon and is a product resulting from the action of the heat of the electric arc on lime and coke. A short ton of calcic carbide, 95 per cent pure, may be counted upon to produce 10,000 cubic feet of illuminating gas, which gas is over ten times brighter than the present average illuminating gas. If calcic carbide could be produced for $30 per ton, including conversion of the same into gas, the resulting gas would cost $3 per thousand; hence, as this gas is ten times brighter than ordinary illuminating gas, the proportionate amount of illumination could be had for 30 cents per thousand. The production of water gas in the United States is now costing from 30 cents to 40 cents, or more, per thousand, varying according to the care in the management of the work. This figure does not take into consideration the handling of the gas further than putting it in the holder. Calcic carbide is now being produced, and has been for about two years past, at Neuhausen-on-the-Rhine, with water power, and in one of the most complete electrical and industrial plants in the world, at a cost of three and one-half cents per pound, or $70 a short ton.

An Interesting Telephone Installation.

In the ELECTRICAL REVIEW issue of December 11 appeared a brief outline of an entirely new telephone equipment for street railways then being installed by the National Telephone Manufacturing Company of Boston on the lines of the Braintree & Weymouth electric road.

The article, brief as it was, attracted considerable attention and led to a good deal of correspondence from all over the country, asking for further details.

In view of the interest aroused, and the installation being now completed, a member of the ELECTRICAL REVIEW staff has visited the scene of operations and tested the system thoroughly. Several views of the equipment have been taken and will appear in our issue of next week, together with a fuller description of the mechanism and its operation than was before possible.

The new telephone line connecting Tunkhannock and Eatonville, Pa., which was erected by Dr. J. W. Dennison, is now complete and works satisfactorily. He expects to extend a line to Dixon also in the near future.

STORAGE BATTERY APPLICATIONS.

A Topical Discussion before the American Institute of Electrical Engineers, New York and Chicago, November 20, 1895.

COMMUNICATION BY NELSON W. PERRY, E. M., ON "THE STORAGE BATTERY OR THE GAS ENGINE AS AN AUXILIARY."

Whether it is economical or not to equip a central station with an auxiliary storage battery plant, is a question which must be decided separately for each particular installation. Generally speaking, the question will be decided by the character of the load line—a broad-topped curve being the most unfavorable and a sharp peak the most favorable to storage battery economy. Again, a station having a very light day load may use the battery to good advantage, even though its night load may present a broad-topped aspect.

Aside from purely economic reasons, convenience may be controlling, so that it is impossible to state, unless all the conditions are known, whether the storage battery is advisable or not.

The price of the battery is an important element, of course, but less so than popularly supposed, for the space which it occupies and the cost of maintenance may largely overbalance any gain in first cost over the cost of the extra boiler, engine and dynamo.

In regard to the cost of maintenance, manufacturers are willing to guarantee that it will not exceed 10 per cent per annum, but it is well to understand just what this 10 per cent means. It means, in the first place, that if you put in all the battery power that the manufacturer recommends, and take care of the battery exactly as he says, then the guarantee holds good. Under such conditions the manufacturer is undoubtedly safe, but if we install a plant under these conditions, we are pretty sure to find that the economy in first cost of the battery over engine and dynamo has entirely disappeared.

Then it is well to understand beforehand what the 10 per cent means—10 per cent of what?

Some time ago I had occasion to inform myself accurately on this subject, and to this end entered into quite a correspondence with the president of the leading storage battery company of this country. As regards the guarantee, he wrote me under date of June 18, 1894, as follows:

"We send you by to-day's mail our illustrated catalogue and would especially call your attention to the question of maintenance as contained on page 11. We undertake, in these cases, to provide renewals when renewals are required, at a specific price, with a guarantee that this will not be required sufficiently frequent (*sic*) to exceed an average of 10 per cent per annum. We have every reason to believe from our experience so far that the actual cost of maintenance when the batteries are used at normal rates will not exceed five per cent."

Turning to page 11 to see what this meant, I found the following:

"This company is prepared to undertake maintenance contracts according to a scheduled rate of charges, for periods up to 10 years or longer, under which they will guarantee that the total amount paid for renewals during the term of the contract shall not exceed 10 per cent per annum on the *catalogue* price of the cells specified in the contract. . . . . *In all cases of renewal by* contract the old material becomes the property of the company, *and must be returned to their works free of charge for carriage or packing.*"

[The italics are mine.]

Since the regular trade discount at that time was 20 per cent of the catalogue price, and a further discount was offered which made the cost of the batteries comparable with that of an engine and dynamo, the guarantee assumed a very different aspect from that which it bore on its surface. When to this was added the cost of packing and carriage back to the factory, it ceased to be an attractive guarantee, and my calculations showed that in many cases where the storage battery might be recommended, if the guarantee was what it appeared to be, it would not be economical under the guarantee as it actually was.

As before indicated, there are some situations in which either convenience or extreme steadiness of current may be controlling in deciding the question of the use or not of storage batteries. But where the question is one purely of economy I would not myself recommend their use under any circumstances, simply because there is a still more economical method at hand. I refer to the gas engine. Even if it were necessary to use illuminating gas from the street mains, it would be more economical (considering space and other factors) to take the peak of the load with a gas engine than to install a battery for this purpose. In this case there would be no standby losses and the engine would be ready at a moment's notice to be thrown into service.

It is a fact that has been amply demonstrated by others as well as myself, that a given number of lights can be produced with half the gas burned in a gas engine that is required to produce them in ordinary burners. The mechanical efficiency of the gas engine is not quite so high as that of large compound condensing steam engines, rarely ever exceeding 83 to 85 per cent, while the latter may go to 90 per cent, but the total efficiency from fuel to the pulley of the gas engine is about double that of the steam engine—reaching 25 per cent under favorable conditions, whereas, with the steam engine it rarely equals 12 per cent. So that with the gas engine operating at anywhere near its full load, there would be a gain in efficiency, instead of a loss of say 20 per cent where the battery was used.

As indicating the performance of a gas engine using illuminating gas at various loads, I quote the following figures obtained from a test of a 12-horse-power (actual) gas engine:

Actual horse-power developed.	Gas consumption (cubic feet) each actual horse-power.
12	15
11	15.3
10	15.5
9	16
8	16.5
7	17
6	18
5	19
4	21
3	26
2	30
1	48

These figures are somewhat better than would be obtained in practice, but go to show that the gas engine compares favorably at light loads with the steam engine under similar conditions.

Thus far I have spoken only of illuminating gas, but the power may be much more cheaply generated by using a fuel gas.

The cost of producers or generators comes to about $11 per horse-power capacity, considerably less than the cheapest boiler, and an idea of the space required may be gained from a statement of Mr. J. Emerson Dawson, who, in estimating for a plant of 400-kilowatt capacity, says that if the gas plant is all on one level, it would occupy a ground space of 27 feet by 54 feet, but, if necessary, all except the gas-holder can be placed under or over the engine room. His estimate for such a plant is, including erection, foundations and ash pit for generators, $5,500 or $10.38 per horse-power.

These fuel gas generators can utilize advantageously the poorest grades of fuel, and produce from the better grades of anthracite about 160,000 cubic feet of gas of a calorific value equal to one-quarter that of 16 candle-power illuminating gas per ton of coal.

As to the standby losses of the gas producers, this has been very carefully determined in a number of cases. As an illustration I will cite a single case—by no means the best on record.

At Openshaw a generator which supplied gas for from 250 to 300 initial horse-power was shut down for 41 hours, and the fuel consumption during this time was but 3.9 pounds per hour or about one per cent. When we compare this with the standby losses of the steam boiler, which is estimated by Professor Kennedy at 10 per cent of the total consumption in all the boilers, we see how insignificant it is.

A situation usually considered peculiarly adapted to the storage battery is in subordinate or outlying stations where they are charged during the daytime from the central station, and act as centers of supply during the nighttime.

But gas can much more economically be distributed to these stations than can the electric current, for Mr. Denny Lane* has shown that with ordinary 16 candle-power gas 3,000 horse-power can be sent a mile for an expenditure of one horse-power, or one-thirtieth of one per cent of the power conveyed.

My own calculations show that a six-inch pipe will deliver 6,000 cubic feet of gas per hour at a distance of 10,500 feet under four inches of water pressure. If this be 16 candle-power gas, allowing 25 cubic feet per horse-power hour, this quantity represents 240 horse-power.

Cast-iron pipe, six inches in diameter, having a thickness of one-half inch, weighs 31.9 pounds per foot. The total weight of this two miles (nearly) of pipe will therefore be 334,950 pounds. This would be equivalent in conductivity to about 41,869 pounds of copper. But four miles of copper weighing 41,869 pounds would be equivalent to about four No. 000 Brown & Sharpe wires, which would have a resistance for the four miles of 0.325 ohms. If the charging current were transmitted at 220 volts, there would be required a current of 848 amperes; but a wire having a resistance of .325 ohms will only deliver under a pressure of 220 volts 220÷.325=677 amperes; there would, therefore, be required five No. 000 Brown & Sharpe wires to deliver this energy, and the weight of this would be 53,540 pounds.

If the distribution took place at 1,000 volts, the amperes required would be approximately 180. To deliver this at the same distance with a loss of 10 per cent would require 6,264 pounds of copper, and to deliver it at one per cent loss would require 62,642 pounds, which would cost far more than the pipe, and still give less efficient transmission.

I think it would be very easy to prove that the gas engine with fuel gas would prove a much more economical auxiliary to the central station for taking the peak of the load, and the loads amounting to fractions of a unit, than the storage battery, and when we consider the efficiency of transmission of energy in the form of gas, which will permit of the location of the gas generators where land is cheap and fuel easily procured, it seems to me that the plan must commend itself to electrical engineers.

Unfortunately the gas engine business in this country seems to be in the hands of parties totally incompetent to handle it properly, as every one knows who has ever had occasion to seek information from them.

It is probably not too much to say that every attempt thus far made in this country to adapt the gas engine to electric lighting has proved a failure. Our own manufacturers either do not know what their engines are capable of doing, or else they are afraid to make public what they will do. I believe there is not a single manufacturer who has a printed price list, and my own experience and that of others whom I know has been that it is impossible to get prices quoted, until the manufacturer or his agent has been thoroughly satisfied of the exact purpose for which the quotations are desired. Information of any kind is almost impossible to get; and guarantees of performance, when given, are worthless. To such an extent is this true, that nearly all, if not all, the recent large orders for gas engines have gone abroad where the business is conducted on business principles.

In England, Germany and France the gas engine has come into extensive use in isolated lighting, and already has been adopted with satisfactory results in several central stations of considerable size.

When the business is properly handled in this country we may expect to see the gas engine make its way rapidly in the lighting industry here also, for it has merits which need only be known to be appreciated.

ABSTRACT OF DISCUSSION.

Mr. J. Appleton: There are one or two things about Mr. Perry's communication to which I would like to call your attention. He advocates the use of generators driven by gas engines for taking the peak of the load in central stations. Now, in any station of a reasonable size this peak must be at least 400 horse-power. In order to take this with gas engines, it must be necessary at least to have two or more engines driving generators. I would like to ask Mr. Perry if he has tried to run dynamos in parallel with gas engines of that size. If he tried it once, I do not think he would be inclined to advocate it in this way. I notice Mr. Perry begins his communication by advocating the use of gas engines for electric lighting, and then goes on to say that he does not think there is a single case in this country where they have been successful. I think this must be due to the fact that he has never tried to use them in conjunction with storage batteries. The modern gas engine, as built in this country to-day, I do not think is very far behind the European gas engine. Germany is considered the home of the gas engine, but I think we are getting nearly as good results in this country now as they are obtaining there. In fact, I know of many isolated plants which are working perfectly satisfactory with a combination of a gas engine and storage battery. Mr. Perry calls attention to the fact

*Electrician, October 9, 1891.

that in England, France and Germany a great many isolated plants and also central stations are using gas engines, but I venture to say that not five per cent of the whole number are running without a storage battery in combination. Referring to his suggestion of transmitting power to outlying stations by means of gas through an iron pipe, even if the gas engine were available for taking the load in the outlying district during certain hours of the day, I think his calculations are wrong in one respect. He compares the price of the iron pipe, to the price of copper mains. Now, I take it that if he has his iron pipe, he must have his copper mains as well, and, having his copper mains, he might just as well use them to transmit current to the outlying districts and charge the storage battery, raising the pressure by a booster.

With regard to the general use of the storage batteries in this country, I think the previous practice has been wrong in this respect. The individual conditions of each case have not been considered. When an engineer considers any particular installation, he looks to the conditions and puts down his generating plant to suit those conditions, and it must be done in the same way with a storage battery. There are storage batteries built to-day for certain purposes which ought not to be discharged above a 10-hour rate. Then, again, there are storage batteries built to discharge at a half-hour rate, because for heavy work and for regulation a battery must be capable of discharging at a very heavy rate. With regard to the question of regulation, recently I have had occasion to figure on a problem where there was an output of about 2,000 horse-power from one station; it was a fluctuating load, resulting in a variation in voltage of about 20 per cent; by the application of a battery which would give about 350 horse-power at a one-hour rate, it is possible to keep that fluctuation down to a total variation of two per cent, and I think that is nearly as close as most engineers want. A great many of the speakers, or some of them at least, have said that the previous storage battery plants have not been a success, and in connection with this there is one point, I think, which has been quite overlooked. A storage battery will not show signs of distress when it is very heavily overloaded. You take a case of a dynamo and battery working in parallel on a two or three wire system; say some extraordinary conditions arise on the circuit, such as a short circuit; the battery would take a very great deal more than its share of the load. The generators begin to kick at once. The battery will take all that is wanted; and it is this very fact of your being able to get out of a battery nearly everything you want—whether the battery is built to discharge at a high rate or not—that has been the ruin of a great many batteries in previous years.

Mr. Chas. Blizard: We do not recognize the company Mr. Perry so mysteriously describes as "the leading storage battery company of this country."

Through an oversight, unintentional no doubt, Mr. Perry does not quote from a letter under date of June 11, 1894, sent him by this same "leading storage battery company," in which the matter of maintenance is dealt with as follows:

"We will undertake to maintain installations of our accumulators, when operated at normal rates, upon a basis that will limit the cost of perpetual maintenance to 10 per cent per annum upon the original cost."

If Mr. Perry had brought his communication up to date, he might have quoted from the current edition of the catalogue issued by the storage battery company in question in regard to maintenance as follows:

"The company is prepared to undertake maintenance contracts, under which they will guarantee that the total amount paid for renewals during the term of the contract shall not exceed 10 per cent per annum on catalogue prices of the cells specified in the contract," the clause covering the return of the old material being omitted.

It is generally understood that retail prices are not maintained when wholesaling.

It is not a fact that the public has been led to understand by the battery company or its representatives that the guarantee offered means anything more or less than what is distinctly stated in the catalogue, and the fact that in the letter from which Mr. Perry quotes he was referred to the catalogue for terms of guarantee, is a sufficient refutation of his argument.

Mr. Perry's criticism would seem to cover the manufacturer who recommends the installation of a battery of capacity suitable to the work to be done, and who asks when giving a maintenance guarantee that the battery be worked within its normal limits and handled in accordance with the simple rules, which experience has proven, produce the best results as to efficiency and durability. I fail to see the injustice or hardship involved in these requirements.

Mr. Perry's statement that the guarantee holds good when the battery is cared for in exact accordance with the instructions laid down by the manufacturer, conveys the impression that an infraction of the rules would necessarily nullify the guarantee. While the selling company would undoubtedly have the right to withdraw, I do not know of a case in which such a course has been taken.

"The leading storage battery company of this country" does not anticipate that its business will be materially affected by Mr. Perry's alleged discovery of the difference between its nominal and actual guarantees.

Mr. Perry: Replying to Mr. Appleton, I believe that he was right—that in most of the applications of the gas engine abroad the storage battery is also used, as it is in connection with dynamos driven by steam engines. He speaks of the peak of the load requiring in the neighborhood of 400 horse-power. The largest gas engine so far constructed, so far as I know, single-cylinder gas engine, is of 375 horse-power, with fuel gas; with illuminating gas it will go something over 400, perhaps 450, horse-power, and it has been repeatedly stated by English manufacturers that they were ready to make gas engines in 1,000-horse-power units whenever wanted. But it is customary, I understand, where the large units are employed, to use two-cylinder gas engines, so that we may have, for instance, an engine of two cylinders, each of which would separately give 200 horse-power, and the explosions are so timed as to give an explosion once every revolution. There is an advantage in that since it makes the angular velocity of the armature more regular. Then in regard to the transmission of power by means of gas to an outlying station. Mr. Appleton suggested that we have the copper mains also. My idea was to supplant the copper mains with the gas mains, and while I suggested a six-inch pipe, that was assuming that we required that power continuously. With the storage battery the claim is that we may use a smaller conductor, and by charging for a long time we can store up a large amount of energy to use when the demand is excessive. The same would apply to gas storage. You have your gas-holder there, and instead of using a six-inch main to carry that energy that distance, you might use a very much smaller one, and charge your gas-holder during the day, or during the hours of light loads, and your expense of transmission would be still less, and the interest on investment would be still less; and the other object in transmitting by gas to outlying stations was that the efficiency of transmission would be very much greater, at a distance of two miles even, than if you used a transmission of a thousand volts, which I suppose would be about as high as it would be proper to transmit current for the storage of energy in storage batteries.

In regard to Mr. Blizard's remark, in reading a paper before the National Electric Light Association, at Cleveland, I was jumped on by a member of the leading storage battery company of this country for some of my remarks in regard to the storage battery at that time. He distinctly stated at that time, if I recollect his remarks, that the cost of maintenance, guaranteed charges, was 10 per cent on the price of the battery, and this letter that I referred to and the catalogue—the catalogue was the one in force at that time—contradict that statement flatly. This is the first opportunity I have had of replying to it. I have seen a later catalogue since that and this also bases the guarantee on the catalogue prices. I also have in my possession the letter to which Mr. Blizard referred, but which I have not copied here. That letter, as I recall it now, is less specific than this one—this one being very specific—as it states here: "We send you by to-day's mail our illustrated catalogue, and would especially call your attention to the question of maintenance, as contained on page 11." That seemed to be very specific as to what their guarantee means. Their guarantee was on the catalogue price and not on the cost price; and at that time and in that place it is stated that: "In all cases of renewal by contract, the old material becomes the property of the company and must be returned to their works free of charge for carriage or packing." Now the omission of that statement from the new catalogue does not convince me that they do not expect that. I know from the experience of some others—not my own experience—that when you ask for a battery for some particular purpose where the discharge is pretty rapid, or for some very unusual use, the guarantee which they offer you, or that they print in their books, or that they talk about, no longer holds. They want a very much larger price for their battery, or their guarantee will be very much less favorable. And I admit that it is perfectly proper that they shall protect themselves; that that battery shall be used under certain conditions and in certain ways. They cannot guarantee a battery or a steam engine or anything else that is improperly used. But what I maintain is, that it is not economical under most conditions of central station practice, or at least where the demand is somewhat excessive in the way of discharge, to use the storage battery; that their prices are put up so high in order to give them a safe guarantee. Now there was a paper read at the Philadelphia meeting of the Institute by Mr. Griscom, in which he stated that if you make your storage batteries large enough, the depreciation may be reduced to practically nothing. That we all know. So if you do make your storage batteries large enough, the company are perfectly safe in making you a guarantee of three per cent, or two per cent, or one per cent, if they choose; but your investment charges are very much larger under those conditions.

OUR CANADIAN LETTER.

DIGBY, N. S.—The New France Milling Company will build an electric railway.

ST. CATHARINES, ONT.—The ratepayers will probably vote on a by-law next month to establish a civic electric plant.

HULL, QUE.—Contractor Viau states that he will shortly make an offer to the council to light the streets by electricity. The council, on the other hand, are considering the purchase of a plant.

MONTREAL, QUE.—The street railway company has been granted the permission by the road committee to build a line on Mount Royal avenue. The extension will mean about four miles of additional track.

QUEBEC, QUE.—The shareholders of the Montmorency Light and Power Company, at a meeting held on December 11, 1895, decided to accept the offer of the electric street railway company for the purchase of the stock and franchise of the former company.

NEWMARKET, ONT.—A meeting was held recently in regard to the proposed Ontario & Lake Huron Electric Railway, at which Mr. Pew, the promoter, stated that he had been requested to extend the line to Goderich by way of Wingham. The Dominion and Provincial governments have granted bonuses to the extent of $6,200 a mile.

SCHOMBERG, ONT.—L. E. Hamoly, who is interested in the proposed electric railway between Aurora and this village, was here recently in connection with the scheme. He stated that the probable cost of the road would be about $200,000, and that the bonus by-law would be submitted to the municipalities as soon as a government charter is secured. A. B. Armstrong, of Toronto, is solicitor for the applicants.

QUEBEC, QUE.—Mr. Beemer is pushing his scheme along to consolidate all the electric and street railways in and around Quebec. The stockholders of the Montmorency Electric Power Company are called to meet to-morrow to decide whether they will accept the Beemer offer. This contemplates the purchase of the whole stock by the company represented by Mr. Beemer at the rate of 15 per cent, that is to say, 50 per cent above par, and of 38 per cent over its actually quoted value.

Mr. Beemer's scheme calls for a capital of $2,500,000, and there are New York and Baltimore capitalists ready to put their money into it.

J. A. C.

Montreal, December 26.

It is probable that Congress may order that all overhead wires in Washington, D. C., be placed under ground.

The Yale-Weston Triplex Spur-Gear Block.

The accompanying illustrations show the details of the Yale-Weston triplex spur-gear block, made by the Yale & Towne Manufacturing Company, of Stamford, Conn., and which was briefly referred to in the ELECTRICAL REVIEW last week. The many uses to which chain blocks may be put in electric light and power stations renders a description of this new block a matter of interest to station managers.

The two most important elements in a hoisting machine are the velocity ratio and the mechanical efficiency. The "velocity ratio" or leverage is the number of feet of rope or chain which the operator must overhaul with his hands to lift the load one foot. With a low-velocity ratio the operator can lift only a small load, but can lift it quickly; with a high-velocity ratio he can raise a large load, but only slowly. The choice between these conflicting conditions is a matter requiring great experience and good judgment, and depending also upon the purposes for which the machine is intended. The "mechanical efficiency" of a hoist is a term which indicates the percentage of the applied power which is utilized in lifting the load, the difference between the power applied and the power utilized being the amount of power consumed or wasted in overcoming the friction of the machine. Common hoists rarely have an efficiency of more than 50 per cent, which means that of each 100 foot-pounds of energy applied by the operator one-half is utilized in lifting the load and the other half is wasted in overcoming friction. In most chain blocks the efficiency is necessarily less because of the unavoidable friction of the chain, and still more because of the "self-sustaining" feature which such blocks usually possess. The triplex block, described below, is claimed to have an efficiency of nearly 80 per cent. Heretofore it has been an established fact that chain blocks possessed a low "efficiency," the best of those hitherto made giving back only about 32 per cent of the work expended by the operator, the other 68 per cent disappearing in wasteful friction and its unavoidable wear. The object sought in the triplex block was to increase the efficiency and diminish the enormous loss; the result is a block which utilizes 80 per cent of the workman's labor.

This extraordinary result is accomplished by separating the sustaining mechanism from the hoisting gear, so that the operator is not wasting a large part of his effort in overcoming the resistance of the friction upon which the sustaining feature of the block depends.

The hoisting mechanism is clearly shown in Figs. 2 and 3, and consists of a direct train of spur gears from the small pinion on the central shaft to the internal gear wheel cast within the main frame. The three intermediate gears between the pinion and the internal gear are carried on the circular frame or cage, and roll around with the internal gear, thus forming a sun-and-planet motion by which the desired leverage is obtained.

The great advantages resulting from this triple arrangement of gears are increased wearing surface, subdivision of strains and an accurate equalizing of the load. The frame upon which these intermediate gears

FIG. 1.—THE YALE-WESTON TRIPLEX SPUR-GEAR BLOCK.

are mounted is keyed fast to the hub of the hoisting chain sheave, and the central pinion shaft is operated by the hand-chain wheel, so that the power of the operator is transmitted from the hand chain to the load chain through a direct spur-gear train of high efficiency, with a leverage of about 30 to 1.

The sustaining mechanism is placed at the hand-chain end of the block (the left of Fig. 3), and consists of a set of brass friction disks, the disks being alternately attached to the central axis and to a ratchet check wheel. The hand-chain wheel is screwed upon the central spindle as shown, and the construction is such that it is clamped tightly by the friction disks to the shaft, either if it is rotated in the direction for hoisting, or if the shaft attempts to revolve in the opposite direction under the pull

FIG. 2.—INTERIOR VIEW OF HOISTING MECHANISM, YALE-WESTON BLOCK.

of the load. The parts being thus clamped together, act as one, and the ratchets offer no resistance to the effort of the operator in hoisting. When the direction of the hand chain is reversed the alternate disks are released, and the others being held by the ratchets, the load is lowered against their friction at a rate entirely controlled by the movement of the hand chain, while the stoppage of the hand-chain movement causes the disks to tighten at once and sustain the load perfectly.

ELECTRIC RAILWAY NOTES.

The sale of the Chattanooga, Tenn., Electric Railway, a $3,000,000 property, was postponed on December 23, on account of the war scare panic. Judge Meade, of Brooklyn, vehemently denounced this procedure, averring that he held 104 bonds and was prepared to purchase the road.

There are rumors of trouble between the Knights of Labor employed on the Brooklyn Heights system, of Brooklyn, N. Y., and President Rossiter. The men contend that the Brooklyn Heights and Atlantic Avenue Railroad Companies sent nearly 500 motormen and conductors to Philadelphia to help out the Union Traction Company of that city during the strike there.

The Pittsburgh Traction Company, the Duquesne Traction Company and the Central Traction Company are now practically part of the Consolidated Traction Company, of Pittsburgh, Pa. The stockholders of the three corporations have voted to lease their properties to the Consoli-

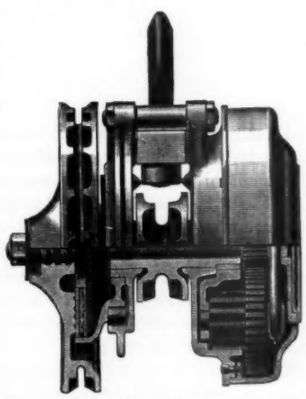


FIG. 3.—SIDE VIEW OF HOISTING MECHANISM, YALE-WESTON BLOCK.

dated company for a period of 950 years. The consideration aggregates an annual rental of $340,000.

Judge Jenkins on December 23 signed a decree of sale in the foreclosure proceedings against the Milwaukee Street Railway Company. The plaintiffs to this action are the Central Trust Company, New York; the North American Company, Nelson Robinson and the Milwaukee Street Railway Company, of New Jersey. F. M. Hoyt is appointed special master to carry the decree into effect.

The Bath & Lake Keuka Railway has been incorporated to operate a street surface electric road 10 miles long from the Soldiers' Home, Bath, to the village of Hammondsport, N. Y. The capital is $100,000, and the directors are Israel A. Kelsey, of West Haven, Conn.; John T. Prince, of Boston; John T. Prince, Jr., C. L. B. Tyler, F. H. Viele, George E. Tyler, Charles M. Hyde, E. J. Carpenter and John L. Miller, of Corning.

President Rossiter, of the Brooklyn Heights Railroad Company, of Brooklyn, N. Y., recently proposed to the trustees of the New York and Brooklyn Bridge a scheme for running electric cars over the bridge. The plan contemplated an elevated roadbed over the present driveways. The bridge trustees do not favor Mr. Rossiter's plan. It would add an extra weight to the structure, which, in the opinion of the engineers, might render it unsafe.

Two important cases came to an end at Clarksburg, W. Va., on December 26. Both were heard by United States Judge Goff, in chambers. The cases of William M. Kidder et al. *vs.* the Long Island Traction Company and the New York Guaranty and Indemnity Company *vs.* the Long Island Traction Company et al. were consolidated, and upon the hearing a settlement was reached by which $5,500,000 will be paid by the purchaser of the Long Island Traction Company property and at once distributed.

In compliance with an agreement made with the employés of the Steinway Electric Railway, in Long Island City, N. Y., about a year ago, the company distributed between $4,000 and $5,000 in Christmas gifts to 192 of their workmen. Prizes of $25 were paid each motorman and each conductor who got through the year without an accident to his car. Ninety-eight men got $25 prizes. Then there were 94 lesser prizes distributed among employés, graded according to the length of time they have been on the road. Both the company and men are well pleased with the working of the scheme.

The close competition of the two big trolley systems in Brooklyn, N. Y., the Brooklyn Heights and the Nassau company, promises to bring fares down and further improve the accommodations provided for the public. No reduction of fare is promised by the managers of the Heights system, but Mr. Flynn is reported as saying that it was his purpose to reduce the fare on the Nassau roads to four cents and to extend his roads to Fort Hamilton and Flatlands. President Rossiter, of the Brooklyn Heights Railroad Company, contemplates many extensions and improvements to his company's system during 1896.

An Acetylene Company with $7,000,000 Capital.

The New York Carbide and Acetylene Company was incorporated on December 24, to manufacture and sell gas-producing materials and acetylene gas, and to distribute other than by the use of mains liquefied gas, and to manufacture and deal in gas apparatus, in Millbrook, Dutchess county. The capital is $7,000,000, divided into 70,000 shares, and the company, it is reported, begins business with its full capital. Directors—E. C. Benedict, Anthony N. Brady, Edward N. Dickerson, J. Bertschmann, Charles F. Dietrich, Walton Ferguson, John Fox, R. Somers Hayes, Erasmus J. Jerskanowski, Frederick P. Olcott, Arthur B. Preal, John Sloane and Samuel Thorne, of New York city. Julius J. Suckert, of New York city, subscribes for 69,988 shares of the capital stock of the company.

ADVANCE INFORMATION

Valuable News and Tips for Manufacturers and Dealers.

We publish below information relating to new electric railways, new electric light companies, new telephone companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW.

Electric Light and Power.

MONTREAL, QUE.—The sale of real estate and other property of St. Jean Baptiste Electric Company (in liquidation) took place on December 19, at the office of Mr. Charles Desmarteau, the official liquidator, No. 1598 Notre Dame street. The whole property was disposed of, the Hon. L. Tourville being the purchaser, for the consideration of $53,000. The book debts, which totaled $3,700, were sold at 35 cents on the dollar.

MARTHA'S VINEYARD, MASS.—A new electric light and power plant company has been started at this place, of which John A. Duggan, of this city, has been elected president and John R. Graham, vice-president.

GORHAM, N. H.—The Gorham Electric Light Company will henceforth be known as the Cascade Electric Light and Power Company. The new company propose to fully develop their water power, estimated to be about 2,000 horse-power, and put in large light and power dynamos.

BAR HARBOR, ME.—Bar Harbor's electric light plant has been enlarged to supply 5,000 lights.

SALINA, KAS.—Leavenworth capitalists will put in an electric light plant at this place.

BENTON HARBOR, MICH.—Preliminary steps are being taken by the city council to secure an electric lighting plant to be owned and operated by the city.

PRATVILLE, ALA.—There is some talk here of putting in electric lights.

SAVANNAH, GA.—Mr. Graham, the proprietor of the Pulaski House, has just closed a contract with the Brush Electric Light and Power Company for lighting his entire hotel with electric lights for a term of years.

BEEVILLE, TEXAS.—Mr. Geo. W. Greathouse has just succeeded in organizing a company to put in an electric light plant here.

NEW BRIGHTON, S. I.—The New Brighton Light, Heat and Power Company has been incorporated. It will be located at No. 23 Jersey street. The president is William Irving, of New Brighton.

WINONA, MINN.—The Winona General Electric Company's Boston bondholders have come to an agreement looking towards the organization of the plant, and it is expected by January 1 to have the plan of reorganization perfected.

BELLEFONTAINE, OHIO.—The $20,000 electric light plant is now being constructed, and is expected to be completed about February 1. The power of the plant will furnish 90 arcs and 3,000 incandescents to light the city.

SYRACUSE, N. Y.—Syracuse Gas Company has been incorporated by Robert C. Pruyh, of Albany; Stephen Peabody, Emerson McMillin and others, of New York city; to manufacture gas and electricity for light, heat and power. Capital stock, $2,500,000.

ALEXANDRIA, LA.—The city will double the capacity of its electric light plant, put in dynamos, etc. The superintendent of the city electric light plant may be addressed for information.

GAINESVILLE, FLA.—J. M. Graham and others have petitioned the City Council for an electric light franchise.

NORFOLK, VA.—The Norfolk Electric Light and Power Company has been incorporated by Paul K. Boyd, B. N. Sperry, Geo. Russell and others; to supply electricity for light and power. Capital stock, $15,000, with privilege of increasing it to $500,000.

UNIONVILLE, MO.—The city is inviting bids for the proposed $18,000 electric light plant. G. H. Gardner, city clerk, may be addressed for information.

CARROLLTON, ILL.—Ornan Pierson, mayor, can give information concerning establishment of electric light plant, for which bids are being invited until January 14.

FREEHOLD, N. J.—A new electric light of 2,500,000 candle-power will be established at Barnegat Lighthouse.

SEATTLE, WASH.—The Seattle Gas and Electric Light Works is reported to have been sold for $1,000,000 to a party of Eastern capitalists headed by Samuel Hill, of Minneapolis.

NEW LONDON, OHIO.—A new electric light plant is to be established at a cost of $15,000. The plans call for a plant with power enough to furnish 90 arc and 2,500 incandescent lights.

GREENVILLE, N. C.—The Greenville Lumber Company has been given permission to put in an electric light plant to light the entire city.

WESTPORT, MO.—A. S. Marley, city attorney, may be addressed for information concerning the issuance of $75,000 worth of bonds for electric plant, etc.

CHARLOTTESVILLE, VA.—The Charlottesville & University of Virginia Electric Light and Gas Company has made a proposition to light the city.

WAYCROSS, GA.—The Satilla Manufacturing Company is in the market for equipment for electric light plant.

GRAND RAPIDS, MICH.—The Buchanan Power and Electric Company's plant will be sold at Buchanan on January 17 by order of the United States court. The property consists of dynamos, water-power machinery and other apparatus used in lighting a village.

ALEXANDRIA, VA.—The Wheeless Electric Lamp Company has been granted a charter by Judge Norton, the objects of which are to buy and sell patents covering electric lamps, etc.

New Telephone and Telegraph Companies.

ROME, GA.—The telephone exchange is to be extended and improved. The cables have been put in and a lot of new instruments, poles and wires are to be put in at once.

HONESDALE, PA.—The right of way has been granted to the Citizens' Telephone Company. The new company has its wires through White Mills and to the Hawley line. They have secured many subscribers, and the telephones now in are giving good service, which will be even improved when the plant is well established.

NEWTON, N. Y.—Arrangements are being made for a telephone line between this place and Stanhope.

WILLIMANTIC, CONN.—It is currently reported that this and other cities of Connecticut are soon to have a new telephone service, and that the establishment of a rival to the Southern New England Telephone Company is now a certainty. The new organization will be known as the People's Telephone Company, of New Haven, and the promoters are George W. Coy and Martin Garrison, of that city. It is proposed first to construct a local branch in New Haven, and just as soon as it is completed it is the intention of the company to construct similar branches in the different cities of the State.

MT. PLEASANT, PA.—The Westmoreland Telephone Company is connecting its line with this place and Scottdale.

MAPLE RAPIDS, MICH.—The Gratiot Telephone Company is now extending its line from this place to St. Louis.

MORRISVILLE, VT.—The Morrisville Union Telegraph Company is the latest enterprise. It has offices in different parts of the village. Extensions are talked of.

FORT FAIRFIELD, ME.—The White Mountain Telephone Company will soon begin the extension of the telephone line from this place to the boundary line, putting in a metallic line, granular button.

SENECA FALLS, N. Y.—The telephone line at this place will be extended through Seneca county south, touching Bearytown, Romulus, Willard, Ovid, Farmer Village and Trumansburg, thence to Ithaca. The proposed extension has been surveyed and the last stake was driven a week ago.

TUSCOLA, ILL.—Douglas County Telephone Company has been incorporated by John T. Todd, Joseph W. Hamilton and George W. Grimms; to operate a telephone exchange. Capital stock, $25,000.

TRENTON, N. J.—American China Development Company has been incorporated by Frank Trenholm, of New York, N. Y., E. H. Lyons, Greenwich, Conn., and S. S. Walters, of Jersey City; to construct and operate telephone and telegraph lines, etc. Capital stock, $1,000,000.

KALAMAZOO, MICH.—The Kalamazoo Telephone Company has been incorporated by C. H. McGurrin, William A. Doyle, Henry F. Hodgeman, Charles A. Peck and others. Capital stock, $30,000.

New Electric Railways.

SPARTA, TENN.—J. R. Tubb and others are interested in the construction of an electric line between Sparta and Cookeville. The road will be about 20 miles long.

FRONT ROYAL, VA.—A company will probably be organized to construct a trolley line from Culpeper to Front Royal.

SAN FRANCISCO, CAL.—The Electric Railway Hill-Cable Company has been incorporated by N. W. Griswold and others, to build a cable or electric railway. Capital stock, $1,000,000.

GRAHAM, VA.—Walter Graham is interested in the construction of proposed electric line, which will be three miles in length.

LOUISVILLE, KY.—Chief Engineer Rowland Cox, of the Louisville, Mount Washington & Fairfield electric line has completed surveys of the road, and is preparing to obtain estimates for construction.

MOODUS, CONN.—People of this place are talking of raising capital to build the Moodus, Marlborough & Glastonbury electric road to connect at South Glastonbury with the Hartford line. The road was chartered in 1893.

FORT WAYNE, IND.—The Fort Wayne electric street car system has passed to the control of a Cleveland syndicate, headed by John J. Shipperd. The new company will be known as the Consolidated Railroad Company; capitalized at $1,500,000.

PHILADELPHIA, PA.—Plans are being drawn for an extension of the Old York road trolley line through Jenkintown and the Wharton Railroad Switch property to the Willow Grove pike, and from there to Glenside.

WILLOUGHBY, OHIO.—Ground has been broken in this place by the Cleveland, Painesville & Eastern Railway Company for car houses and power house. The former will cost $10,000 and the latter about $50,000.

ROCKFORD, ILL.—The West End Electric Railroad, of this city, has been sold to Bentley Masslick, of Chicago, representing the Guarantee Title and Trust Company.

SEATTLE, WASH.—Hugh L. Thomas will apply to the council for a franchise to construct a double-track electric road between Tacoma and Seattle. The line will be called the Seattle, Tacoma & Portland Electric Railway, the company desiring to ultimately complete it to Portland.

Increase of Capital Stock.

NATICK, MASS.—The Natick Gas and Electric Company have asked permission to increase its stock $5,000 to make extension in Wellesley.

FREEPORT, ILL. — The Freeport General Electric Company certified to the increase of its capital stock from $125,000 to $150,000.

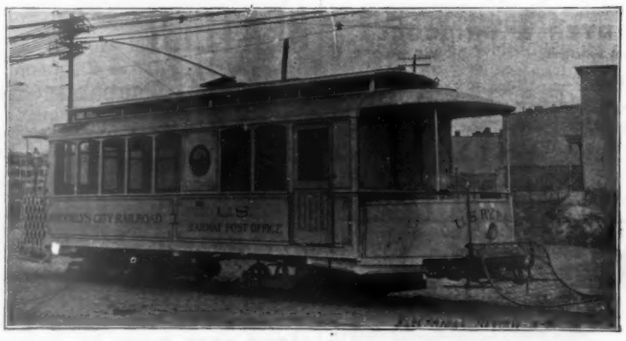
MORRIS, ILL.—The Fields Electric Light Company certified to the increase of its capital stock from $15,000 to $30,000.

CONCORD, N. H.—Railroad Commissioners have granted the petition of the Manchester Street Railroad Company for leave to increase its capital stock $175,000.

New Manufacturing Companies.

CHICAGO, ILL.—Elliptical Carbon Company has been incorporated; capital stock, $100,000; to manufacture carbons. Incorporators, Fred DeLand, David T. Foley and Francis E. Drake.

CLEVELAND, OHIO.—The Walker Company has been incorporated, under the laws of New York, by John Ludwig, of Brooklyn, and Charles N. King and Martin W. Dixon, of Jersey City, to manufacture electrical machinery. Capital stock, $2,000,000.



ELECTRIC RAILWAY MAIL CAR ON THE BROOKLYN HEIGHTS RAILROAD COMPANY'S LINES, BROOKLYN, N. Y.

Business Troubles.

BOSTON, MASS.—W. B. Southgate & Company, dealers in electrical supplies, 146 Franklin street, have filed petitions in insolvency.

MILWAUKEE, WIS.—H. Peterson, electrician, is reported to have given judgment for $1,036.

BOSTON, MASS.—George D. Burton, electrician, has filed a petition in insolvency.

TRADE NOTE.

The New England Engineering Company, of Waterbury, Conn., are to be credited with having installed more central stations for electric lightingand electric railways than any other engineering company in this country, and they have always been highly successful. They report the outlook for 1896 as exceedingly good, and are rushed with work even during the holiday season.

LITERARY.

Cassier's Magazine has gathered into its January number some of the best available electrical talent on both sides of the Atlantic, and the result is what has very appropriately been termed an "Electrical Number."

There is but one collection of the portraits of Lincoln that pretends to be complete, and that is the collection made by the publishers of *McClure's Magazine*. They have been able to secure either originals or copies of every photograph, daguerreotype, ambrotype, drawing or painting of Lincoln, so far as known, in existence. There are in this collection fifty photographs, ambrotypes and daguerreotypes. The best collection of Lincoln heretofore published in any work contained ten portraits.

American Street Railway Association.

The ELECTRICAL REVIEW is advised that all street railway men and others who expect to attend the next meeting of the American Street Railway Association in St. Louis, Mo., will do well to engage their hotel accommodations as soon as possible. The Southern Hotel has been selected as the headquarters of the association, and Mr. Lewis, the manager of the hotel, will make reservations for all who apply. The meetings of the association will be held in the Olympic Theatre, just across the street from the Southern Hotel. The exhibition hall has not yet been selected.

The Barnesville, Ohio, *Enterprise*, speaking of the exchange of the Western Telephone Construction Company's apparatus in its city, says:

The telephone company found much difficulty in getting the first forty subscribers and for a time it seemed that it would be a failure for the want of patronage. As soon as the first 'phones were put in, however, and their usefulness and convenience noted, there was no further trouble on that score. The company now has about one hundred subscribers and new ones are coming in every week. They are rendering good service and excellent satisfaction, and many people are wondering how they ever got along without them.

Judge Williams, of Little Rock, Ark., has allowed S. W. Fordyce and A. N. Johnson $10,000 each for services as receivers of the City Electric Street Railway Company.

Brooklyn Electric Mail Cars.

The five new postal cars which have been put in service in Brooklyn, N. Y., under the contract with the United States Post Office Department, taking effect Wednesday, December 18, were built for the Brooklyn Heights Railroad Company by the J. G. Brill Company, of Philadelphia. The cars are 24 feet 8 inches long inside and 35 feet over all. The mail compartment is 12 feet, inside measurement, by 7 feet 4 inches wide, and is fitted up with the standard steam railway post office fittings, consisting of 200 pigeonholes for distribution of mail, and with standard pouch racks, sorting tables, etc., and also furnished with a cooler for ice water and water for washing purposes.

These cars will be run as a sub-post office and stamps may be purchased from the postal clerks in any quantities.

The passenger compartment is also 12 feet in length, finished in natural cherry and reversible Hale & Kilburn seats upholstered in spring rattan, and seats comfortably 20 passengers. Electric call bells are opposite each seat for signaling the conductor. The platforms are four feet six inches long with rounded dash, open on one side, and a large single door near the step, instead of in the center of the car, as customary. They are lighted by eight lights in the passenger and 10 lights in the postal end, and are also furnished with platform lights and electric headlights. The passenger end of the car is equipped with electric heaters. The cars are mounted on double trucks, eight wheels under each car, making a very comfortable, easy riding car.

These cars will be used as ladies' cars and will be run upon a regular time-table between City Hall and Hunter's Point, *via* Myrtle avenue and the regular crosstown route through Washington avenue, and also be run on Fulton street between City Hall and East New York. Time-tables will be placed in each car. These cars are said to be the handsomest postal cars run outside of the regular steam United States railway post office routes.

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Cheap for cash. Good electrical supply and construction business in live Southern city. Good reasons for selling. Address "SOUTHERN,"
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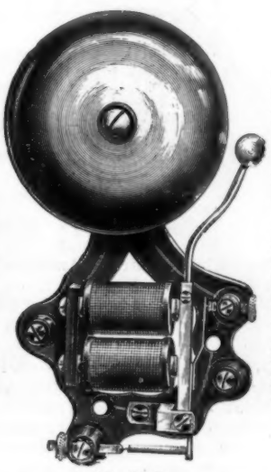

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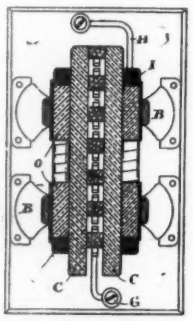
ELECTRICAL PATENTS

ISSUED DECEMBER 24, 1895.

551,757 Electrically operated elevator; F. B. Corey, Boston, Mass.

551,781 System of electrical distribution; T. F. Mullaney, Worcester, Mass.—A system in which the conductors are divided into sections with means for throwing the grounds of the different sections upon conductors of the same polarity.

551,785 Electric brake; W. B. Potter, Schenectady, N. Y.—A plurality of electric motors having equalizing connections across similar terminals of the field magnets and the armatures at each end thereof, in combination with brake magnets, and a resistance included in the local circuit with the motors.



No. 551,786.—LIGHTNING ARRESTER.

551,786 Lightning arrester; W. B. Potter, Schenectady, N. Y.—Comprises a number of spark gaps in series, each gap inclosed in a chute of refractory insulating material, and a common arc extinguishing means for all of the spark gaps.

551,790 Machine for connecting electric conductors; H. J. Savory, Somerville, Mass.—A machine for connecting a small electric conductor to a large one, consisting of a frame provided with a clamping device to clamp it upon the larger conductor, and a clamping device to clamp the small conductor to the frame, combined with a hand set to upset the small conductor within a perforation within the larger.

551,795 Electro-galvanic belt; S. J. Spalding, Canton, Mass.

551,799 Electric arc lamp; E. Thomson and C. E Harthan, Swampscott, Mass.—Consists of a globe holder mounted on a side rod, and provided with a hub and rim, openings between the hub and rim, and a cup adapted to screw on the bottom of the hub.

No. 551,880.—ELECTRICAL EYE CUP.

551,809 Converting simple into polyphase alternating currents; C. S. Bradley, Avon, N. Y.—Comprises a source of two electro motive forces differing in phase by an oblique angle and inductively co-operating coils having their terminals reversely connected with respect to said electromotive forces.

551,810 Alternating current motor; C. S. Bradley, Avon, N. Y.—Comprises a primary element and a revolving secondary element carrying a sliding switch co-operating with two or more series of contacts for varying the number of effective turns on the secondary winding.

551,856 Commutator brush; C. C. Dusenbury, Lake Mahopac, N. Y.

551,863 Alternating current machine; M. Hutin, Paris, France.—A synchronous alternating current motor having its field magnets excited by a constant current and a condenser of suitable capacity in a shunt across the terminals of the field-magnet windings.

551,880 Electrical eye-cup; T. B. Wilcox, Newark, N. J.—Consists of an insulating eye-cup, and one or more electric generators supported upon the said cup.

551,920 Electric stop motion for machines for preparing silver; W. P. Canning, Lowell, Mass.

551,930 Electric railway train signaling; W. S. Greene, Covington, Ky.—A three-wire system made up of three wires for each member of the train between which communication is desired, and couplers for connecting corresponding wires throughout the train electrically and mechanically, said couplers having duplicate sets of contacts connected up in divided circuit to the three wires.

551,942 Electric latch apparatus for semi-automatic operation of railroad signals; H. C. Barnes, Oakland, Cal.

551,946 Art of recording and reproducing impulses; W. H. Cooley, Brockport, N. Y.—A recording surface consisting of a fillet of any suitable material and means for dividing the same into two mechanically separate and distinct portions along a line normally straight and for varying such line of division exactly according with the impulses to be recorded.

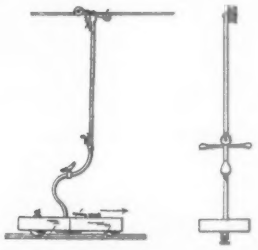
551,947 551,948 Electric telegraph; W. H. Cooley, Brockport, N. Y.

551,951 Automatic temperature regulating apparatus; C. L. Fortier, Milwaukee, Wis.

551,959 Thermostat regulating device; C. A. Hale, Cleveland, Ohio.

551,982 Station potential indicator; R. D. Mershon, Pittsburgh, Pa. Comprises means for reproducing locally in miniature the ohmic and inductive electro-motive forces and the impressed electro-motive force of the main line, and a device for indicating the value of the resultant obtained by combining such electro-motive forces.

551,996 Pedo-electric trolley; R. T. Oney, Charlestown, W. Va.—An individual trolley carriage, comprising a frame, the motor, the trolley and pole, the seat arranged in rear of the pole and the handle bars and rheostat arranged on the said pole.



No. 551,996.—PEDO-ELECTRIC TROLLEY.

551,998 Electric signal; E. M. Phelps, Lynn, Mass.—A circuit controller for use in connection with trolley wires, consisting of a contact and a co-operating rod bent to form the double switch arm pivoted at its ends and having its middle or bent portion astride and resting upon the trolley wire.

552,001 Underground current supply for electric railways; A. Rast, Nuremberg, Germany.

552,036 Material for incandescent conductors; L. K. Bohm, New York, N. Y.—A compound of substance for electrical conductors, consisting of a homogeneous mass of carbon and calcium, forming the carbide of calcium.

552,053 Electrical switch, operating and signal apparatus; J. Dutrey, New Orleans, La.

552,057 Circuit closer and breaker; J. R. Farmer, St. Louis, Mo.

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EXCURSION RATES TO ATLANTA.

On account of the Atlanta Exposition, the B. & O. R. R. Co. will sell excursion tickets at greatly reduced rates. Season tickets will be sold every day until December 15, good returning until January 7, 1896. Twenty-day tickets will be sold every day until December 15, good returning for twenty days from date of sale. Ten-day tickets will be sold Tuesday and Thursday each week until December 24, good returning for ten days from date of sale. The rates from New York will be $37.25 for season, $29.25 for twenty-day, and $24.00 for ten-day tickets.

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Strange Uses of the Long-Distance Telephone.

A good many stories are told of the strange uses of the long-distance telephone, says the Tacoma, Wash., *Ledger*. The day the line was opened to Merrill, Wis., a Chicago man, hunting in the northern woods, came into town and learned of the innovation. He went into one of the "sound-proof" booths and had himself put into communication with his family. As they had a telephone in the house, the task was a small one. He chatted with his wife, told her a fish story at which she might smile without embarrassing him, since he could not see the sign of incredulity; talked with his boy and girl, and then called for "Gyp."

"Gyp" was a setter, a great family pet, which had been left behind because of an accident which rendered it lame. "Gyp" was called to the telephone, and he stood on a chair, his fore feet on the back, and his mistress held the transmitter to his ear.

"Hello, 'Gyp!'" called the master from Merrill. And the dog in Chicago pricked up his ears and whined. The master whistled cheerily, and the setter barked directly into the receiver. He knew his master's voice, and the whistle as well; and the master cheered him by ready laughter at the prompt and eager reply.

It was worth the $2.40 it cost.

A lady living near Indianapolis, who had for more than a year been in delicate health, was brought to Chicago early last winter, where she received surgical treatment in a hospital. It was impossible to take her home for the Christmas celebration, although she had recovered so much that she could walk readily all over the hospital. She had three beautiful children at home, and the father prepared a Christmas tree, just as he had formerly done. Only he added a feature which had never been found there before. He had the electricians come in on the afternoon before Christmas and put his residence telephone in the tree, where it was concealed with pine needles and tinsel. He arranged with the long-distance people, apprised his wife of her part in the play, and at a certain moment in the evening, when the children, bubbling over with joy at their presents, still felt a sadness at the absence of their mother, he clapped the receiver to the ear of his youngest child, and the gentle voice of "mamma" came over the wire.

It was their most precious Christmas present.

Siemens & Halske in New York.

The Siemens & Halske Electric Company of America have opened new offices in the American Surety Building, 100 Broadway, New York city. This will be the general Eastern office, and will be in charge of C. E. Yerkes, vice-president. F. N. Armour, recently of the Chicago office, will be the general sales agent. Chas. D. Shain still retains the agency for New York city and the immediate vicinity.

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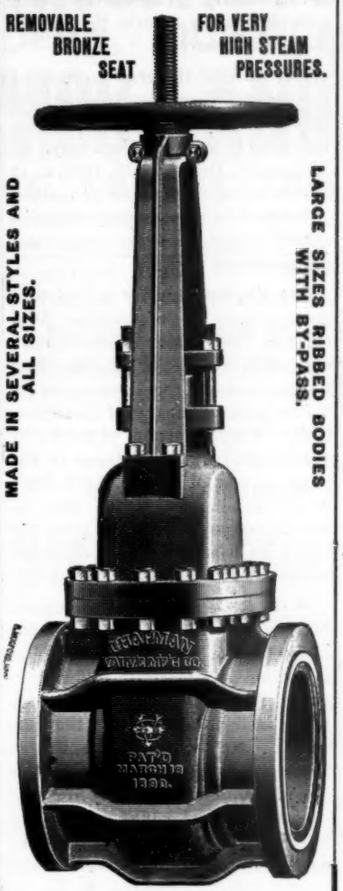
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The Southern New England Telephone Company has issued a new 1896 calendar carrying a map of its lines in the State of Connecticut.

The Electric Appliance Company, of Chicago, is gaining customers and patronage all along the line since the enlargement of its facilities at 242 Madison street.

Transure & Williams, of Alliance, Ohio, have recently equipped their shops with the most improved machinery for the manufacture of drop-forged commutator bars.

The "Wood" Apparatus, manufactured by the Fort Wayne Electric Corporation, is much in demand. The New England office of this company is doing an extensive business.

The Kimball Electric Company, of Fitchburg, Mass., has bought out the construction business of the Gardner, Mass., Electric Light Company, together with the stock and materials for wiring.

The Rhode Island Tool Company, Providence, R. I., has issued a handsomely lithographed hanger as a holiday remembrance to its customers and friends. It represents three little girls in Winter costumes. The color work is excellent.

The Garvin Machine Company, of New York, are doing the most extensive business of their history. Their machines are found in constant use in nearly every first-class factory in this country. These active young men abundantly deserve the success they have achieved.

The Annual General meeting of the Okonite Company, Limited, was held at the office of the company, 13 Park Row, New York city, on Wednesday, December 18, 1895, at 12 o'clock noon. A number of matters of interest to the company were discussed. The accounts were also presented and passed.

The Engine industry is finding a great activity in the electrical field. One of the most widely known engines in America is the Hamilton-Corliss, made by the Hooven, Owens & Rentschler Company, of Hamilton, Ohio. A representative of the ELECTRICAL REVIEW noticed one in the large factory of the Packard lamp people at Warren, Ohio, and on inquiry learned that it had given the highest satisfaction, though subjected to the severest trials.

H. E. & C. Baxter, of Brooklyn, N. Y., have won an enviable reputation for the mystic "No. 7707" of their iron box bell. It is found in every first-class electrical supply house, and always satisfies the purchaser. No house in the United States excels the Baxter firm in this line of manufacture. They are large general electrical manufacturers, and have a busy factory located on the corner of Bedford, Division and Canton streets, Brooklyn, N. Y.

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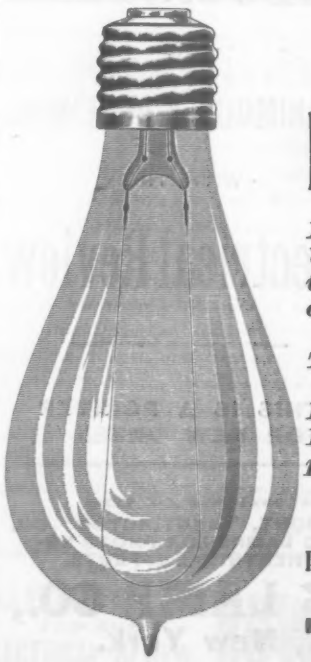

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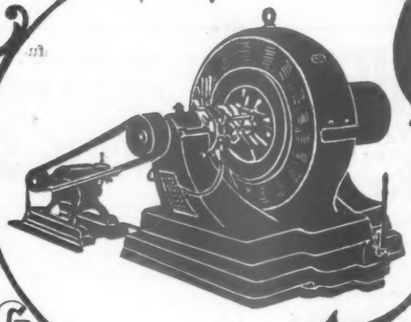

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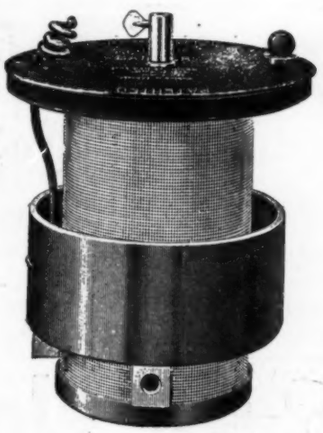

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